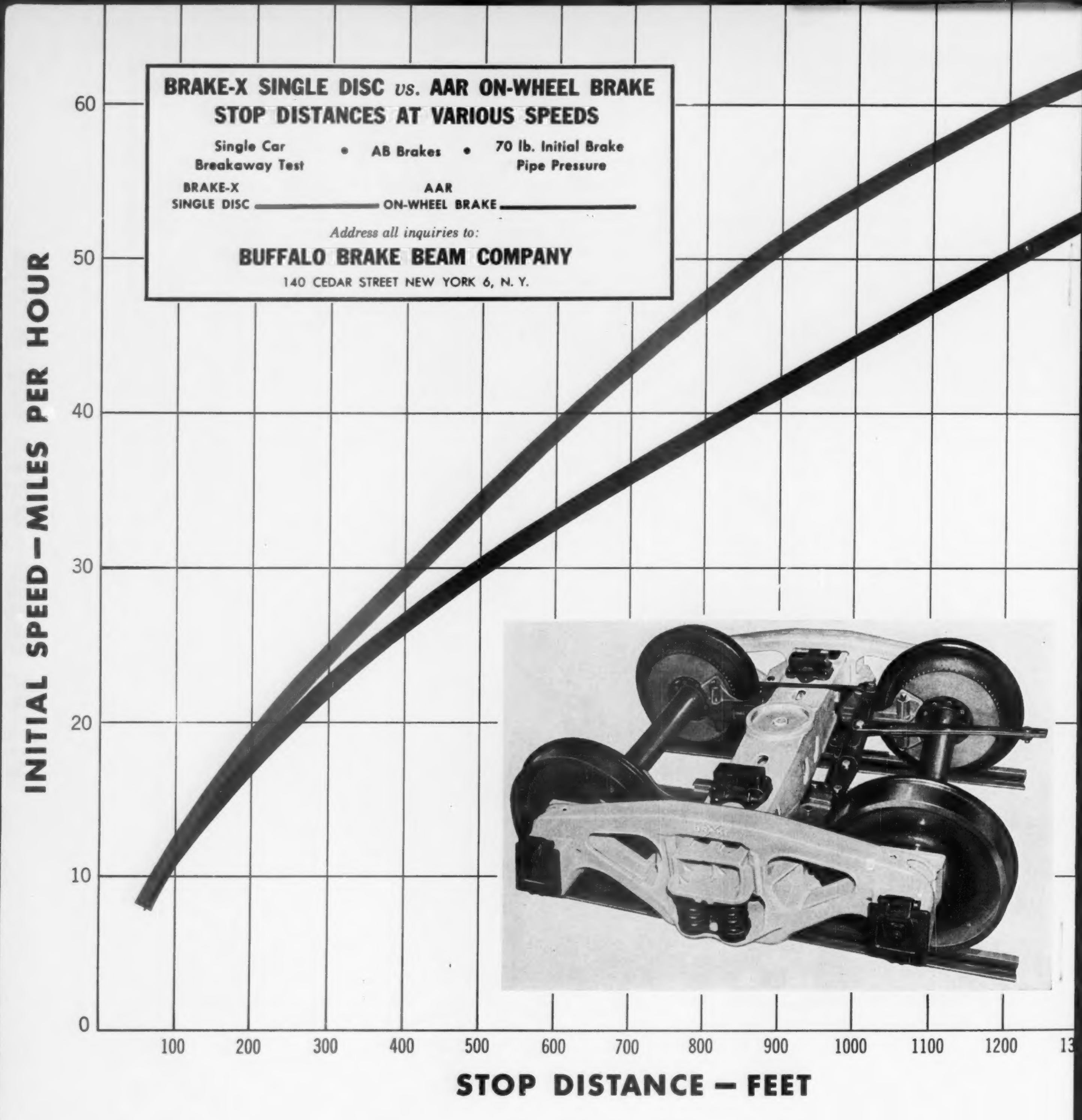
DECEMBER [illegible] . . . New Lightweight Passe[illegible] Trains . . . p. 24

RAILWAY AGE

One of Five Simmons-Boardman Railway Publications



the BIG NEWS for '56

RAILWAY AGE

EDITORIAL AND EXECUTIVE OFFICES AT 30 CHURCH STREET, NEW YORK 7, N. Y., AND 79 WEST MONROE STREET, CHICAGO 3, ILL.

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December 26, 1955
Vol. 139, No. 26

CONTENTS and

Week at a Glance

The U. S. highway is a mighty busy place these days. In fact, the I. C. C. estimates that in 1954, motorists traveled about 520 billion miles on it to get from one city to another.

Obviously, many motorists drove these hazardous, tiring miles only because they needed a car at their destination. But you can put many of these highway miles on your tracks . . . and increase your passenger revenue with the Hertz Rail-Auto Travel Plan. This increasingly popular mode of travel offers Americans the speed and luxury of modern trains . . . plus the convenience of a clean, new Hertz car at their destination.

Last year alone, people who rented Hertz cars at their destination actually traveled more than 136 million miles on the railroads first. Now, you, as railroad management, can put even more highway miles on tracks by telling more people about the plan. Here are some simple ways you can help:

1 TRY the Hertz Rail-Auto Travel Plan yourself. See how courteous, convenient and economical Hertz service really is.

2 URGE your ticket agents to ask passengers this simple question: *"May I reserve a Hertz car for you at your destination?"* The agent who makes the reservation gets 10% commission on the total rental charge.

3 DISPLAY specially designed and attractively printed Hertz signs on the grill of your ticket agents' windows. The signs read, *"Reserve your Hertz car from your ticket agent,"* and are available, along with passenger Rail-Auto folders, at no charge to you.

4 MENTION the plan in your own advertising as an added inducement for persons to travel by rail. Use displays in your ticket offices. Advertise the plan in your timetable . . . on your billboards . . . on highway over-passes. This way, you will be taking advantage of the **$1,000,000** Hertz spends every year in leading national magazines to advertise the Rail-Auto Travel Plan.

And remember this: Only Hertz, largest rent a car system in the world, can truly back up the Rail-Auto Travel Plan with thousands of cars at nearly 900 offices in over 600 cities throughout the United States and foreign countries. And because of more than 30 years in the business, Hertz offers your passengers only the finest, most courteous service. With Hertz you're also assured of steady Rail-Auto Travel Plan business because more than 1,500,000 persons now hold Hertz Charge Cards and Courtesy Cards. Hertz also honors Rail Credit Cards. For more information about the Hertz Rail-Auto Travel Plan, and for reservation forms or other display material . . . write or phone.

HERTZ *Rent A Car* **SYSTEM**

Dept. D12, 218 South Wabash Avenue

Chicago 4, Illinois; phone: WEbster 9-5165

HERTZ RENT A CAR SYSTEM ®

Current Statistics

Operating revenues, ten months	
1955	$8,374,221,196
1954	7,780,406,868
Operating expenses, ten months	
1955	$6,294,360,120
1954	6,158,779,123
Taxes ten months	
1955	$ 923,043,139
1954	740,223,069
Net railway operating income, ten months	
1955	$ 947,241,229
1954	671,849,861
Net income, estimated, ten months	
1955	$ 753,000,000
1954	484,000,000
Average price railroad stocks	
December 19, 1955	97.09
December 20, 1954	85.73
Carloadings revenue freight	
Forty-nine weeks, 1955	35,921,937
Forty-nine weeks, 1954	32,182,493
Average daily freight car surplus	
Wk. ended Dec. 10, 1955	5,728
Wk. ended Dec. 11, 1954	36,003
Average daily freight car shortage	
Wk. ended Dec. 10, 1955	2,768
Wk. ended Dec. 11, 1954	292
Freight cars on order	
December 1, 1955	109,370
December 1, 1954	14,805
Freight cars delivered	
Eleven months, 1955	33,137
Eleven months, 1954	33,385
Average number of railroad employees	
Mid-November 1955	1,077,086
Mid-November 1954	1,036,734

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RAILWAY AGE IS A MEMBER OF ASSOCIATED BUSINESS PUBLICATIONS (A.B.P.) AND AUDIT BUREAU OF CIRCULATON (A. B. C.) AND IS INDEXED BY THE INDUSTRIAL ARTS INDEX, THE ENGINEERING INDEX SERVICE AND THE PUBLIC AFFAIRS INFORMATION SERVICE. RAILWAY AGE, ESTABLISHED IN 1856, INCORPORATES THE RAILWAY REVIEW, THE RAILWAY GAZETTE, AND THE RAILWAY AGE GAZETTE. NAME REGISTERED IN U. S. PATENT OFFICE AND TRADE MARK OFFICE IN CANADA.

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Departments

Week at a Glance CONTINUED

BRIEFS

A major railroad, so far not active in "piggyback" operations, may be heard from soon.

An increase in passengers has recently been reported by the Hudson & Manhattan, which, operating between New York City and New Jersey, is hit hard by competition of tax-exempt river crossings of the Port of New York Authority. From January 1 to October 24 of this year the H&M carried about 107,000 more passengers than in the comparable 1954 period. The current year is the first since 1948 which has seen a passenger increase instead of a loss.

More than 95% of the ties in tie-laid tracks maintained by railroads at the end of 1954 were treated. The exact figure was 95.1%, leaving only 4.9% of the ties untreated. Progress made in 13 years is pointed up by comparable figures as of the end of 1941—83.7% and 16.3%, respectively. Average cost per treated tie laid in replacement was $3.37 in 1954, $1.31 in 1941.

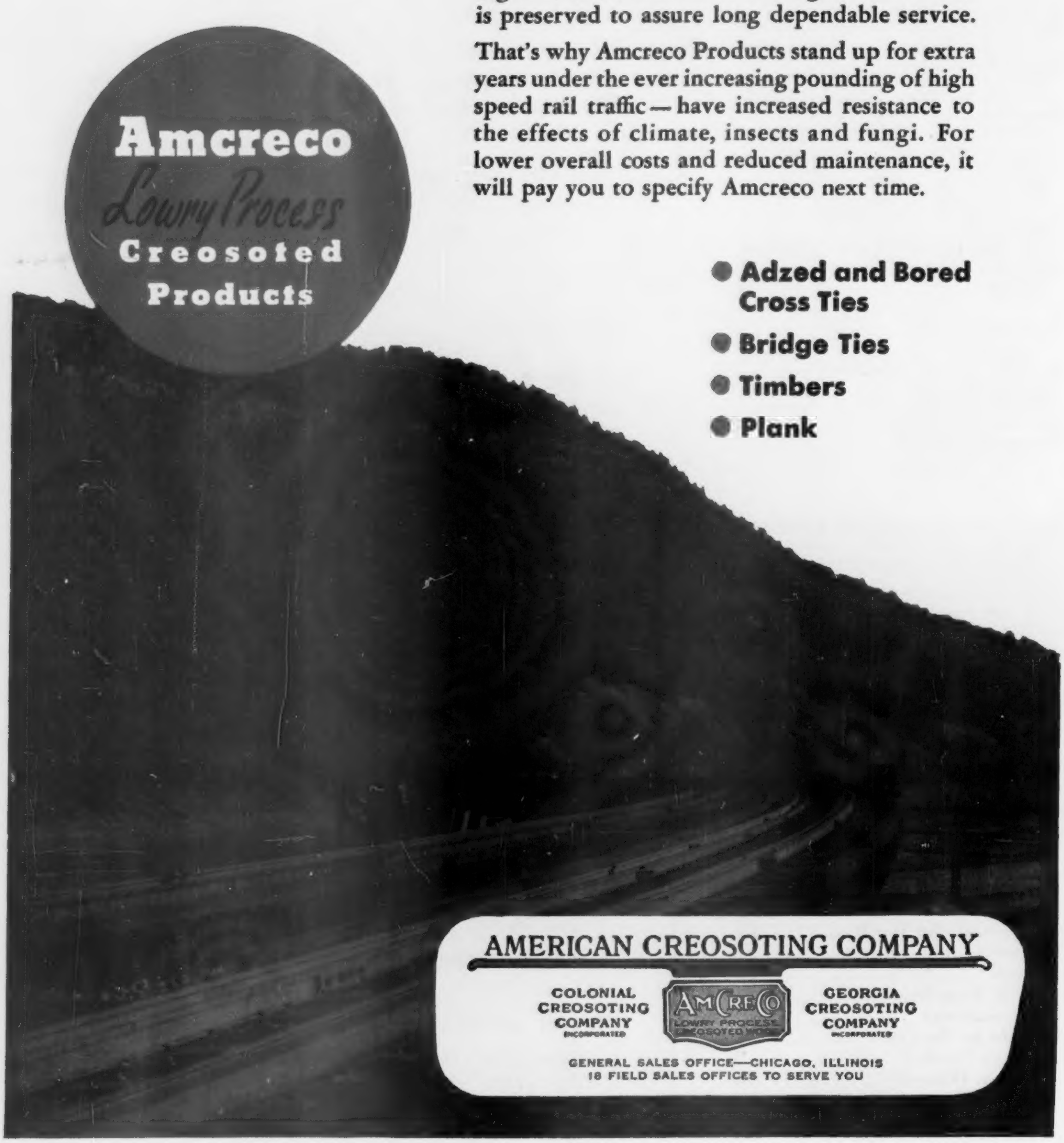
Travel advertising gets more public receptivity than any other product field, according to a Tide Magazine survey of its readership panel of manufacturers, agency men and public relations executives.

AMCRECO
PRESSURE TREATMENT means Longer Service Life Reduced Maintenance Costs

In Amcreco cross ties, bridge timbers and piles, Lowry Process Pressure Treatment makes the big difference. The natural strength of the wood is preserved to assure long dependable service.

That's why Amcreco Products stand up for extra years under the ever increasing pounding of high speed rail traffic—have increased resistance to the effects of climate, insects and fungi. For lower overall costs and reduced maintenance, it will pay you to specify Amcreco next time.

- **Adzed and Bored Cross Ties**
- **Bridge Ties**
- **Timbers**
- **Plank**



Rock Island to Get Revolutionary Cars

Fifty 35-ft units, slated for early delivery, are radical departure from conventional car design

The Rock Island will shortly receive from a car builder the first of 50 "revolutionary" new design freight cars—cars that will couple low initial cost with wide flexibility in service.

While the road has revealed only sketchy details so far, Downing B. Jenks, executive vice-president (Mr. Jenks becomes president of the railroad January 1), last week gave *Railway Age* these highlights:

The new cars will be 35-ft long, with four wheels and fixed axles. They will be equipped with tightlock couplers, roller bearings and new cast steel type wheels.

Basic concept is for a strong long-life underframe on which a "demountable" body can be placed.

The body can be transferred to and from the car with a crane or other device, and can be transported on streets and the highways by a flat bed truck.

Cost of the car and detachable body, including also a flat bed highway trailer, will be less than half that of a conventional flat car with tiedown equipment and an ordinary highway trailer.

While the first car—to be delivered in January—will have a van-type body, many modifications are possible for the future. According to Mr. Jenks, different superstructures or "bodies" can turn the basic car into a gondola, a hopper, a tank car or even, conceivably, a passenger-train car such as a baggage unit or coach.

One of the first units received by the railroad will probably be tested as a trailer behind a Budd RDC car, for transportation of head-end traffic.

These first 50 cars are being built by ACF Industries, with delivery expected by mid-1956.

Advantages.—"We see this approach (the new design freight car) as having several advantages," Mr. Jenks said. Use of the short unit—somewhat similar in size, at least, to European freight cars—will permit the railroad to publish lower maximum weights for carload movements.

The removable body, Mr. Jenks said, is aimed at speeding terminal operations, and it will give the railroad new flexibility for serving off-track industries.

Mr. Jenks noted that the new car will offer the "advantages without some of the disadvantages" of present-day piggyback service. The initial investment in equipment and terminal facilities is reduced, the basic car can be used in all kinds of service, and the transportation of dead weight of a trailer undercarriage and wheels is eliminated.

The Rock Island probably will publish carload rates on a truck-competitive basis, for application with the new design car, Mr. Jenks added.

PRR—Rail-Trailer Co. Form T-O-F-C Firm With Car Pool

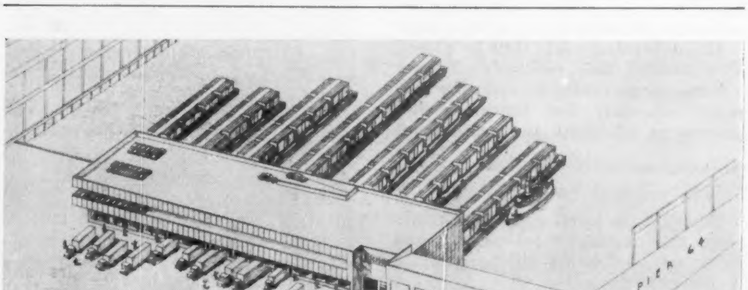
Entrance into the field of highway trailer transportation by rail was announced last week by the newly organized Trailer Train Company, which will provide railroads with special flat cars for transporting trailers in local and interchange service on a national basis. Also, it is planned that the company will provide a new type railroad car for the purpose.

Details of the new type car will be announced as soon as exact specifications and costs are developed. It is anticipated the initial order for the new type car will be placed before the year end. Heretofore unrealized economies in cost, maintenance and operation are said to be assured by its design.

The Trailer Train Company elected James P. Newell, vice-president of the Pennsylvania, as president. Eugene F. Ryan was elected vice-president and general manager. He is president of Rail-Trailer Company, which provides liaison between common carrier truck lines and railroads joining in piggyback service, and operates terminal facilities in railroad yards.

The new company has arranged to purchase 300 75-ft trailer-carrying flat cars from the PRR, and 200 more from Van Car Company, subsidiary of Rail-Trailer, with which to begin operations.

"These modern cars and the new type of car will be operated by Trailer Train Company as a pool to provide a national service over railroads, much the same as private companies provide pools of refrigerator cars for transporting perishables from coast to coast," Mr. Newell explained. "With transportation of common carrier highway trailers well established on several railroads, it is obvious the next step will be through service beyond terminals of single railroads. In fact, interline service is already operating on a limited scale. Trailer Train's car pool will solve the problem of inter-



BALTIMORE & OHIO's new $1,065,000 freight terminal at the foot of West 23rd street, New York City, will be first waterfront structure in city to include roof-top public parking facilities for automobiles. It will provide parking for about 150 automobiles, with provision for accommodating 150 additional cars at a later date. The B&O is using its own funds to construct the project and after its completion, scheduled for early 1957, will sell the structure to the city for cost, after which the railroad will lease the terminal from the city for 10 years at an annual rental of $137,035. The B&O will have the option to renew its lease for another 10 years with a 10% increase in the annual rental. Gross parking revenues to and including $47,500 a year will be retained by the railroad; gross return above that amount will be split equally by the B&O and the city.

AAR Report on 1955 Results

Return, though up from 1954's 3.28%, was still only 4.15% —Continuation of improvement program depends on ability to earn enough to support the necessary investment— Cabinet Committee report an encouraging development

By WILLIAM T. FARICY
President, Association of American Railroads

Freight traffic showed a moderate increase in 1955. Passenger traffic continued on the downward trend that has prevailed since 1952. At the same time, declines were noted in revenues received per freight ton-mile and per passenger-mile, as well as in payments from transportation of mail.

Estimated revenue carloadings in 1955 were 37,800,000, an increase of 11.5% over 1954. Revenue ton-miles of freight in the current year increased 12.9% to 620 billion, but the average revenue per ton-mile declined 3% to 1.37 cents.

Revenue passenger-miles operated by railroads in 1955 totaled 28.5 billion, a decrease of 2.7% under 1954, and average revenue per passenger-mile declined 1% to 2.59 cents.

Total operating revenues during the current year are estimated at $10.1 billion, an increase of 7.7% above 1954. Freight accounted for the bulk of these revenues, increasing 9.5% to $8.5 billion.

Other categories of operations to show revenue increases were express traffic, up 2.4% to $118.3 million, and miscellaneous operating revenues, which showed a gain of 8.9% to reach $417 million.

Operating revenues derived from passenger operations in 1955 declined 4.2% to $735 million, while mail revenues decreased by 8.1% to $282 million. Total operating expenses of railroads in 1955 amounted to $7.6 billion, an increase of 3.1%.

Taxes paid out by railroads in 1955 will total $1.1 billion, an increase of 30% over the tax bill in the previous year. Of the total sum, federal income taxes account for $458 million.

Net income of railroads following deductions for taxes, rentals, fixed and contingent charges and miscellaneous items in 1955 is estimated at $915 million, an increase of 34% over 1954. Earnings for 1955 will give the carriers a 4.15% rate of return, compared with 3.28 in the previous 12-month period.

Railroads in 1955 spent about $890 million on plant and equipment, an increase of $70 million over 1954. This brings the carriers' total capital expenditures since the close of World War II to fully $11 billion.

The amount railroads put into new equipment during 1955 came to $571 million, an increase of $73 million over the previous year. Expenditures for improvements to roadway and structures decreased by $3 million to $319 million.

Indications are that railroads in 1956 will spend more than $1 billion on plant and equipment. They will enter the new year with orders on the books for about 135,000 new freight cars costing in excess of $1 billion, a considerable number of which should be placed in operation during 1956.

Continuation of the railroads' program of improvements is dependent, of course, upon their ability to secure traffic and earnings sufficient to support the necessary capital investment. This will be increasingly difficult in 1956 because of rising levels of wages and prices of materials and supplies, which increases are not as yet reflected in the level of rates.

On the other hand, encouragement is to be found in the recommendation of the Presidential Advisory Committee on Transport Policy and Organization that greater opportunity be allowed for competition in pricing between the different forms of transport.

If competition could thus be placed on a sounder basis, railroads will have a better opportunity to earn the revenues necessary for continued improvement of plant and equipment.

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changing railroad equipment, while at the same time providing the means of securing maximum service from the new type car we will soon announce.

"Formation of the new company," Mr. Newell continued, "will contribute substantially to development of the various types of trailer-on-flat-car service and particularly the coordinated service for common carrier trucking companies, with the many benefits for the public. The new type car, and more effective car supply and distribution, will further expand this new and rapidly growing form of transportation. Further realization of the full potentials of the service is the aim of Trailer Train Company."

Details as to terms upon which railroads can participate in the pool and obtain use of the cars will be available in the near future.

On behalf of the Pennsylvania, Mr. Newell said there will be no change in its TrucTrain service, except as to ownership of the cars to haul trailers. Trailer Train will provide them henceforth.

Briefly . . .

. . . Brigadier General S. R. Browning has replaced Major General Bertram F. Hayford, who retired November 30, as Deputy Chief of Transportation, U.S. Army. General Browning, a West Point graduate, has held high posts in Army transportation operations since 1946.

Efficiency Still On the Upgrade

"Significant indicators of operating efficiency" in railroad freight service all averaged higher in the first nine months of 1955 than in corresponding periods of the two preceding years, the ICC's Bureau of Transport Economics and Statistics has reported.

The report came in the latest issue of the bureau's "Transport Economics," which noted specifically that car miles and net ton miles per freight car day in the 1955 period exceeded those of 1954 by 10.6% and 15.5% respectively. As to passenger service, it was noted that average speed of trains increased "slightly"—to 39.7 mph in 1955, compared with 1954's 39.5 mph and 1953's 39 mph.

People in the News

Johnson to Stay on ICC At White House Request

Interstate Commerce Commissioner J. Monroe Johnson will remain on the commission for "at least three months" after expiration of his term on December 31—at the request of the White House which undertook to oust him last year under the federal government's retirement-at-70 rule.

This was announced by the White House and the commission. Previously, Commissioner Johnson had planned to retire early in January. He will remain under that provision of the Interstate Commerce Act which permits a commissioner to carry on after expiration of his term, until a successor qualifies.

Colonel Johnson is 77 years old. His refusal to be ousted was based on legal advice to the effect that the specific-term provisions of the Interstate Commerce Act override requirements of the retirement-at-70 law.

While he has an order from former President Truman exempting him from the retirement rule, he took the position that such an order was not necessary and thus its revocation by President Eisenhower would not have forced his retirement. He contended that, when the President appoints a person over 70 to a specific term (as happened in his case), the President is presumed to have known the appointee's age; thus, the appointment carries the exemption from the retirement rule until the end of the term involved.

The White House abandoned its undertaking to oust the colonel, so the legal question remains unsettled inso-

far as service on the ICC is concerned. A similar case was that of the late William J. Patterson, but there, too, the White House (in the Truman Administration) backed away from the legal issue.

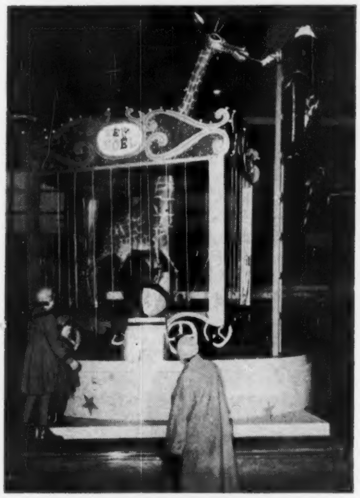
When Mr. Patterson became 70 on June 4, 1950, he was serving a term which ran through December 31, 1952. No exemption order came in timely fashion from the White House, but Mr. Patterson sat tight—even though his uncertain status resulted in his salary being stopped as of June 30, 1950. Within a short while, President Truman issued an executive order exempting Mr. Patterson from the retirement rule, as of July 1, 1950, and until the end of his term. So the legal issue was avoided.

The issue was not raised in the cases of former Commissioners Walter M. W. Splawn and Charles D. Mahaffie. Both accepted retirement when they became 70, although the terms for which they had been appointed had not expired.

Rates & Fares

ICC Unit Compares Rates It Calls Not Comparable

Making a third report on its studies comparing commodity rates and section 22 quotations, the ICC's Bureau of Transport Economics and Statistics has now emphasized that the comparisons "in no way imply that the



GIRAFFE licking lollipop held by his keeper is one of a series of Christmas tableaux in the Canadian National's Central Station, Montreal. Called "Santa's Christmas Carnival," the colorful exhibits were built under direction of A. L. Sauviat, assistant director of public relations in charge of advertising and displays.

RAILWAY MARKET Outlook THIS WEEK

Revolutionary New Car!

► *Rock Island.*—Soon will receive from ACF Industries the first of 50 "revolutionary" new cars that will combine low initial cost with wide service flexibility; different superstructures can turn the basic car into a gondola, a tank car, or even a passenger-train car (further details in story on page 7).

New Equipment

FREIGHT CARS

► *November Orders and Deliveries.* — Orders totaled record monthly high of 51,066, compared with 12,843 in October and 3,754 in November 1954, the ARCI and AAR report; deliveries total 3,427, compared with 3,772 in October and 1,302 in November 1954; December 1 backlog was 109,370 cars, compared with 61,964 on November 1 and 14,805 on December 1, 1954.

Type	Ordered Nov. '55	Delivered Nov. '55	On Order Dec. 1, '55
Box—Plain	19,775	1,345	49,168
Box—Auto	1,600	83	2,517
Flat	1,475	206	3,746
Gondola	2,750	210	7,364
Hopper	19,350	690	32,746
Covered Hopper	2,152	400	5,125
Refrigerator	1,100	86	1,971
Stock	0	26	300
Tank	2,237	268	4,894
Caboose	3	75	162
Other	624	18	1,377
TOTAL	51,066	3,427	109,370
Car Builders	17,289	2,331	50,899
Company Shops	33,777	1,096	58,471

► *Erie.*—Ordered 500 steel box cars from its Meadville, Pa., shop; approximate cost $4,000,000.

►*Kansas City Southern.*—Ordered 600 50-ton 50-ft box cars, Pullman-Standard; estimated cost $4,800,000; delivery expected December 1956 and January 1957; includes 100 damage free cars.

► *Milwaukee.*—Will order 50 50-ton Airslide covered hopper cars; 50 50-ton insulated compartmentizer-equipped box cars; 50 50-ft 50-ton mechanical refrigerator cars; and 1,000 50-ft 50-ton box cars.

► *Santa Fe.*—Will order 2,450 new cars next year; includes 500 50½-ft box cars, 100 DF box cars, 100 75-ft flat cars, 700 70-ton 40-ft 8-in. hopper cars, 500 70-ton covered hopper cars, 250 65-ft mill-type gondola cars, 125 70-ton 52½-ft gondola cars, 175 70-ton drop-bottom gondola cars.

► *Texas & Pacific.*—Directors authorized construction of 230 new steel cars in Marshall, Tex., shops next year; includes 100 50-ton box cars, 100 70-ton gondola cars, 30 70-ton covered hopper cars.

RAILWAYS IN THE MARKET—THIS WEEK

CONTINUED

► *Wabash.*—System ordered 2,300 cars as follows: ACF Industries 400 50-ton box cars (including 100 for the New Jersey, Indiana & Illinois); General American, 900 50-ton box cars (including 100 for NJI&I); Bethlehem Steel, 50 gondola cars; Pullman-Standard, 300 50-ton box cars (for the Ann Arbor), and 100 70-ton covered hopper cars; railroad shops, 400 50-ton box cars, 50 75-ft flat cars; Bethlehem Steel, 100 70-ton gondola cars; estimated cost of cars and six locomotive units (order for which is reported elsewhere in this column), is $21,170,000.

LOCOMOTIVES

► *Louisville & Nashville.*—Plans to order some 50 diesel locomotives early next year; when delivered, the L&N will be completely dieselized.

► *Wabash.*—Ordered six 2,400-hp "Trainmaster" diesel-electric units from Fairbanks, Morse & Co.; each will be equipped with a steam generator.

IRON & STEEL

► *Missouri Pacific.*—Authorized by U. S. District Court to spend $5,912,280 for 1956 rail-laying program, with $1,634,470 of total to be charged to capital account; program calls for purchase of 146 miles of new rail, totaling 30,660 tons; 29 miles of new rail will be of 132-lb type, 117 miles of 115-lb type; 86½ miles of old rail will be re-laid on secondary and branch lines.

New Facilities

► *Chicago, Burlington & Quincy.*—Projects under way at Cicero, Ill., include hump retarder yard, cost $4,016,000, and new 52nd Avenue viaduct, cost $626,286.

► *Louisville & Nashville.*—Directors expected to authorize, early next year, construction of complete new freight terminal at Birmingham, Ala.

► *Milwaukee.*—Major improvements planned for next year will cost $11,150,000; included are: 25,000 net tons of new rail; replacement, renewal or strengthening of bridges; enlarging Western Avenue, Chicago, diesel house, and installation of electrical facilities in coach yards; construction of additional yard tracks and terminal facilities, Council Bluffs, Ia., and Othello, Wash.; line changes and grade revision, Loweth, Mont.; installation of machinery in Tacoma, Wash., shops; and installation of communications.

► *Santa Fe.*—Will spend $25 million for additional improvements to roadway, structures and equipment next year; projects include construction of a retarder yard at Corwith yard, Chicago, cost $6 million; installation of CTC between Fresno, Cal., and Stockton, 123 miles, and between Dalton Jct., Tex., and Saginaw, 33 miles; installation of electronic data-processing machines in the accounting department; placing in service an electronic microscope for testing diesel fuels and greases.

level of section 22 quotations is other than proper under conditions actually encountered."

The latest report was in the December issue of the bureau's "Transport Economics," the third article on the subject which the publication has carried in five months. The original report, published in August, said the average level on section 22 quotations in 1952 was 22% above the level of comparable commodity rates. The second report, appearing in September, said there was an "arithmetical error" in this calculation, that the correct percentage for 1952 was 14, and that the commodity rates involved were on "comparable (but not identical) traffic."

Before making the statement noted above, the latest article reported that the 1954 figures indicated section 22 quotations of that year were about 13% above the level of comparable commodity rates.

This, the article also said, "is not unexpected in view of the different type of traffic involved." It added:

"A substantial portion of the section 22 reductions apply where there is (a) infrequent movements, (b) the only movement, (c) a movement in the opposite direction of the established volume traffic. Commodity rates, of course, apply primarily to volume traffic and average somewhat lower. Section 22 quotations, however, are always reductions below established rates and provide for lower freight charges to the government than otherwise would be the case."

Railroads May Publish Joint Rail-Motor Rates

The Interstate Commerce Commission has made it clear that railroads may publish joint rail-motor rates under provisions of the Interstate Commerce Act.

That ruling was embodied in the commission's report on a case (No. 31586) involving piggyback services of Union Pacific, which involve coordinated rail and truck hauls in line-haul operations. Rejected by the com-

REQUEST IMPENDING FOR 7% RATE HIKE

A request for a 7% across-the-board increase in railroad freight rates was impending when this issue went to press. Announcement to this effect by the territorial committee chairmen, followed a meeting of chief railroad traffic officers in Chicago, December 16.

"The 7% increase is the minimum necessary to offset the cost of recent wage and market price increases which amount to more than $500 million annually," the territorial committee chairmen said (*Railway Age*, December 12, page 5).

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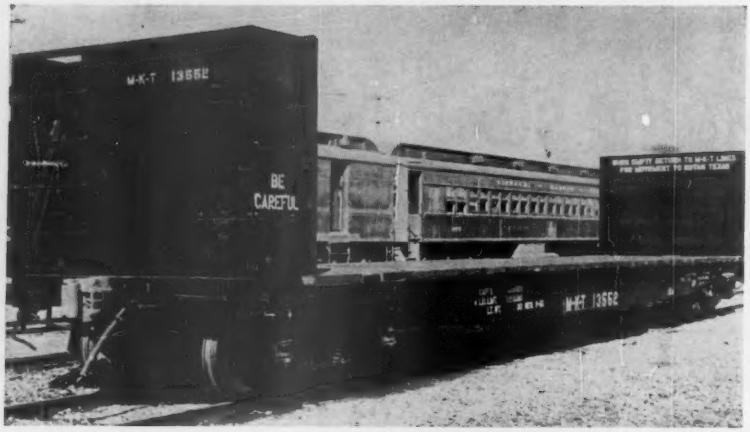


SPECIAL FLAT CARS (one of which is shown here), equipped with steel bulkheads, designed to protect against lading shifts and to facilitate loading and unloading, have been placed in service by the Missouri-Kansas-Texas. The new cars were constructed at the road's Denison, Tex., shops.

mission were contentions that publication by the railroad of the joint rates was illegal because there is no specific statutory authority for it, and thus joint rail-motor rates must be published by motor carriers under provisions of the act's Part II. Noting that nothing in the act prohibits railroads from publishing joint arrangements with truckers, the commission went on to say:

"Joint rail-motor rates may be established either through a tariff publication of the motor carrier or the rail carrier; a tariff in which the motor carrier or the rail carrier concurs; or a tariff published by an agent for either the rail carrier or the motor carrier, or as agent for both."

Competitive Transport

U.S. Chamber of Commerce Taking Highway-Policy Vote

The Chamber of Commerce of the United States has submitted to its member organizations a proposed new policy calling for increased federal aid to highways.

The proposed policy consists of three declarations, as follows:

1. Adequate highways are essential to the nation's welfare. Every effort should be made to create a highway system commensurate with the needs of a growing and dynamic economy, as well as national defense. An expanded construction program is necessary to remedy present deficiencies and improve the nation's highways.

2. Because of the national importance of the interstate highway system, the federal government should assume primary responsibility for financing modernization of this system.

3. Additional funds needed to finance the federal government's augmented share of the costs of the interstate highway system should be obtained to the maximum extent feasible from current revenues. If such revenues are insufficient for these needs, additional funds should be obtained from one or both of the following: (a) reasonable and equitable increases in excise and motor fuel taxes upon highway users, and, (b) bonds issued within the statutory federal debt limit, interest and principal on such bonds to be obtained from suggested additional taxes on users.

Member organizations of the chamber are asked to vote yes or no on each of the declarations. What the chamber regards as the "principal" arguments pro and con each declaration are being mailed to member organizations with the ballots. Deadline for return of ballots is January 26, 1956.

The chamber's present highway policy states that federal aid for the interstate highway system should not exceed the current 60-40 ratio wherein 60% of costs are paid by the federal government and the remainder by the states. If adopted, the proposed policy would authorize the chamber to support a larger federal share of the costs. If the proposed new policy is rejected by member organizations, the present policy will remain in effect.

Air Lines' Ton-Mile Take Is 16 Times Rail Average

The average ton-mile revenue realized by domestic trunk air lines from their 1954 freight operations was 22.88 cents, more than 16 times the railroad average of 1.421 cents. It was also nearly four times the truckers' average of 5.982 cents.

This was reported by the ICC's Bureau of Transport Economics and Statistics in its "Transport Economics."

The report also showed that air lines averaged 41.45 cents per ton-mile on the mail they handled in 1954. The comparable figure for 1950 was 99.99 cents. The bureau attributed this "marked decline" to these factors: Reduction of subsidies; payments on a plane-mile rather than a ton-mile basis; the rates applicable on carriage of three-cent mail by air; and inclusion of air parcel post in air mail.

The bureau also noted that the data are affected to some extent by length of haul and commodities carried. "They are not indicators of rate levels," it added.

Law & Regulation

Defective Switch Stand Caused Frisco Derailment

The Interstate Commerce Commission has found that a defective switch stand caused the August 19 derailment of a St. Louis-San Francisco passenger train at Marked Tree, Ark. The accident resulted in death of four passengers and one dining-car employee, and injury of 18 passengers and five dining-car employees.

The commission's report, No. 3649, was by Commissioner Clarke. Its finding as to the cause confirmed what a Frisco spokesman said at the time of the accident (*Railway Age*, August 29, page 9).

The train involved was No. 105, the southbound "Kansas City-Florida Special," which consisted of a two-unit diesel-electric locomotive and 13 cars. All were of "conventional all-steel construction," except the first, an express-refrigerator car, which was of steel-underframe construction, and the tenth and thirteenth, which were of lightweight steel construction. The tenth was a chair car and the thirteenth a sleeper, and they were equipped with tightlock couplers, as was the ninth car, a chair car.

The derailment occurred as the train was passing through the switch of a cross-over track at a speed of 50 mph, 15 mph below its limit. The locomotive and first eight cars got through the switch, but the rear truck of the ninth car was derailed, as were the tenth and eleventh cars and the front truck of the twelfth.

Separations occurred between the eighth and ninth cars and between the tenth and eleventh cars. The forward portion of the train stopped with the eighth car about 1,700 ft south of the point of derailment, while the ninth car, which became rerailed, stopped 914 ft south of derailment point. None of the derailed cars overturned, but the tenth struck some freight cars on an auxiliary track parallel to the main track. The side of the tenth car "was torn off between a point near the center and the rear end," the commission's report said. It also said the front end

of the eleventh car, a cafe-lounge car, was "badly damaged."

The switch stand found to have been defective was of the low-stand, ground-throw type, installed new in 1942. The commission's report described the stand's mechanism, which included a square section of the spindle fitted in a square hole in the hub of the segment gear and secured by a rivet. The rivet passes through the spindle and both sides of the hub of the segment gear and supports the weight of the spindle and its attachments.

When the housing was removed after the accident, it was found that this rivet had broken and worked out. "The spindle," the report continued, "had worked downward through the hub of the segment gear, and the crank at the lower end of the spindle had been lowered to the extent that the lugs underneath the base of the stand were no longer effective in preventing the end of the connecting rod from rising above the top of the lug on the crank. The end of the connecting rod had become disengaged from the lug on the crank, and the switch points were then free to move."

The "proceed" aspect of the governing signal indicated the switch points were in normal position when No. 105 passed that signal, 1,783 ft north of the point of derailment. Considering also the position of the equipment and marks on the track, the commission reasoned that the switch points remained in normal position until after the front truck of the ninth car passed over them.

Overdriven Rivet—A report by the Frisco's engineer of tests took no exception to the grade of steel of which the rivet was made. It appeared to the commission that "the head at one end may have broken off due to some cause such as cracking resulting from overdriving the rivet when it was applied."

Frisco rules call for thorough inspection annually of switches of the type and age of that involved. Switches in the vicinity of the point of derailment had been getting weekly and semi-annual inspections. During the latter, all bolts in the switches were removed and the bolts and other parts inspected for defects, but a roadmaster was quoted as having said it was not customary to disassemble switch stands or to remove housings during either inspection.

"Three Shall Nots" Seen Cabinet Report Essentials

Basic elements of the Cabinet Report's emphasis on competition lie in the "three shall-not" proposals, an Association of American Railroads spokesman told the Delaware Chamber of Commerce at Greenville, Del., December 14.

Harry J. Breithaupt, Jr., AAR's assistant general solicitor, told the group the prohibitive recommendations are the "real nut and kernel" of the most important section of the whole report. They would prohibit the Interstate Commerce Commission—in considering the reasonableness of a proposed rate —from taking into account, he said, "the affect of the rate upon the traffic of any other mode of transportation; the relationship of that rate to the rates of any other mode of transportation; or whether the rate is lower than necessary to meet the competition of another mode."

Mr. Breithaupt also noted that the AAR approved the proposal that would transfer burden of proof in suspension cases to the protestant, except when the protestant is a shipper. He said the authors of the report felt that suspension proceedings under present rules often were used to delay the effectiveness of rates and to attack pricing adjustments of competing forms of transportation. The AAR agrees, he said, that the report's proposals "would go far to remedy this situation."

Organizations

The **Lexington Group,** an informal association of people interested in railroad history, will hold its annual session at the Mayflower Hotel, Washington, D.C., the afternoon of December 28, in connection with the mid-winter meeting of the American Historical Association. The session will feature papers by three students of Southern railroads.

Ralph C. Champlin, vice-president —public relations of the Pennsylvania, and James B. Shores, director employee-public relations of the Texas & Pacific, have been elected to three-year terms as directors of the **Public Relations Society of America,** Mr. Champlin representing the society's eastern district and Mr. Shores the southwestern district.

Newly elected officers of the **Traffic Club of New York** are: President, E. A. O'Brien, assistant general traffic manager, Union Carbide & Carbon Corporation; first vice-president, William J. Honan, assistant freight traffic manager, Baltimore & Ohio; second vice- president, Horace H. Huston, general traffic manager, American Can Company.

Figures of the Week

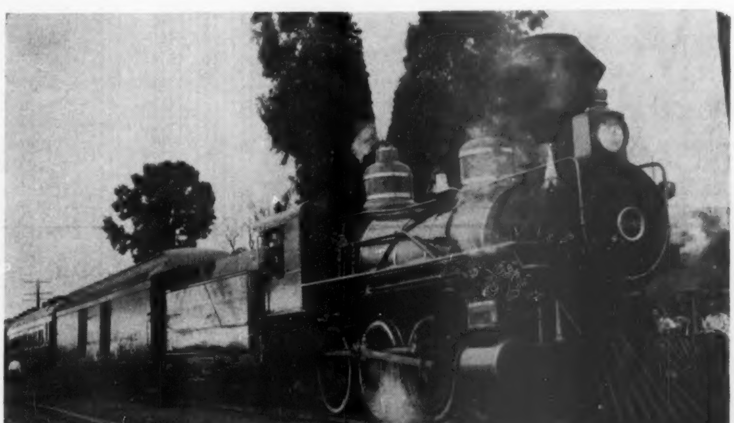
1955 Capital Outlays Will Top $890 Million

Gross capital expenditures by Class I line-haul railroads in 1955 are expected to total over $890 million, the Bureau of Transport Economics and Statistics of the ICC reported in the latest issue of its "Transport Economics."

The report also indicated that 1956 will get under way with first-quarter expenditures up 87% from those of this year's first quarter.

The $890 million total for this year includes actual expenditures made by all Class I roads from January through September, plus estimated expendi-

(Continued on page 16)



STEAM FOR A DAY featured the last run of Engineman Willis A. Silverthorn (in locomotive cab), climaxing 45-year career with Northwestern Pacific. The run, first use of steam power on NWP lines in over a year, was arranged by Pacific Coast Chapter of Railway Locomotive and Historical Society, and attracted 250 railfans from San Francisco area. Diamond-stack locomotive, provided by Southern Pacific, dates to last century. Water for round trip run between Tiburon, Cal., and Healdsburg, was provided by one of the local fire departments.

Years ago, advertisers and agencies led a long, uphill fight to establish the principle that circulation should be audited and VERIFIED.

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are tremendous differences between railway

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PEOPLE DON'T BUY something if they can get the same thing for nothing. But readers find tremendous differences between railway publications today.

As a result, they pay good money so they can spend good time reading the editorial and advertising pages of RAILWAY AGE.

Thus advertising in RAILWAY AGE is read by people who have *elected* to read—real flesh and blood, honest to goodness readers who sign renewals and write checks —readers to whom RAILWAY AGE is essential—"the Workbook of the Railways."

By contrast, the circulation of the No. 2 industry-wide magazine's circulation isn't even verified.

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†Based on the last full calendar year.

book of the Railways

Actual and Estimated Gross Capital Expenditures Class I Line-Haul Railroads

Period	Number of roads	Expenditures for road Thousands	Expenditures for equipment Thousands	Total Thousands
Actual:				
January—September 1954	129	$226,519	$420,500	$647,019
October—December 1954	129	95,001	78,226	173,227
Total 1954	129	321,520	498,726	820,246
Total 1954 adjusted[1]	124	318,067	496,308	814,375
January—September 1955	129	212,366	384,683	579,049
Estimated:				
October—December 1955[2]	124	105,812	186,710	292,522
Actual and estimated:				
Total year 1955	..	318,178	571,393	889,571
Actual:				
First quarter 1955	129	54,112	119,302	173,414
Estimated:				
First quarter 1956[3]	124	72,163	252,125	324,288
Percent of change:				
January—September 1955 vs. same period in 1954 (actual)	..	−6.2	−8.5	−10.5
Year 1955 (actual and estimated) vs. 1954 adjusted	..	..	+15.1	+9.2
First quarter 1956 (estimated) over same period in 1955 (actual)	..	+33.4	+111.3	+87.0

[1] Total figures adjusted to eliminate 4th quarter 1954 expenditures of 5 roads which did not furnish estimates for the 4th quarter of 1955.

[2] Estimates for the 4th quarter of 1955 were not furnished by 5 roads. In the same quarter of 1954 these carriers made expenditures of $3.5 million for road and $2.4 million for equipment.

[3] Estimates for the 1st quarter of 1956 were not furnished by roads. In the same quarter of 1955 these carriers made expenditures of $1.8 million for road and $2.5 million for equipment.

(Continued from page 13)
tures for the fourth quarter which were supplied by all but five roads. The five roads which failed to submit such estimates spent $5.9 million in 1954's fourth quarter.

The bureau's report also included the accompanying table which has more detailed 1955 figures and comparisons with 1954.

Freight Car Loadings

Loadings of revenue freight in the week ended December 17 were not available as this issue of *Railway Age* went to press.

Loadings of revenue freight for the week ended December 10 totaled 727,228 cars; the summary, compiled by the Car Service Division, AAR follows:

REVENUE FREIGHT CAR LOADINGS
For the week ended Saturday, December 10

District	1955	1954	1953
Eastern	124,533	107,746	112,103
Alleghany	147,253	117,832	126,737
Pocahontas	62,225	50,511	47,485
Southern	133,214	120,778	117,311
Northwestern	78,359	79,516	73,745
Central Western	123,646	119,162	116,666
Southwestern	57,998	57,986	57,904
Total Western Districts	260,003	256,664	248,315
Total All Roads	727,228	653,531	651,951
Commodities:			
Grain and grain products	47,145	48,514	42,645
Livestock	11,758	9,980	9,310
Coal	155,343	127,496	119,409
Coke	13,587	9,287	11,112
Forest Products	44,327	43,672	38,963
Ore	21,654	15,528	16,852
Merchandise l.c.l.	60,752	60,879	62,761
Miscellaneous	372,662	338,175	350,899
December 10	727,228	653,531	651,951
December 3	728,216	661,777	662,026
November 26	676,685	583,520	596,230
November 19	771,648	697,346	725,732
November 12	796,632	708,749	727,058
Cumulative total, 49 weeks	35,921,937	32,182,493	36,638,776

In Canada.—Carloadings for the nine-day period ended November 30 totaled 107,892 cars, compared with 80,456 cars for the previous seven-day period, according to the Dominion Bureau of Statistics.

	Revenue Cars Loaded	Total Cars Rec'd from Connections
Totals for Canada:		
November 30, 1955	107,892	40,747
November 30, 1954	108,505	35,972
Cumulative Totals:		
November 30, 1955	3,754,343	1,504,153
November 30, 1954	3,392,414	1,301,645

Financial

Union Pacific.—*Proposed Stock Split.*—This road has applied to the ICC for approval of its plan to split its common and preferred stocks on 5-for-1 basis. The plan contemplates that par values in both cases would be changed from $50 to $10 per share, and that the plan (subject to stockholder approval at next May's annual meeting), would become effective July 2, 1956 (*Railway Age*, December 5, page 72).

Applications

BANGOR & AROOSTOOK.—To issue $8,000,000 of prior lien bonds and 29,762 shares of common stock, proceeds of which (with treasury cash) would finance a refunding operation involving redemption of $10,040,000 of first mortgage, 4½% bonds. The commission has already exempted the proposed bond issue from its competitive bidding requirements (*Railway Age*, November 7, page 40); and it is anticipated that the sale would be on a 4¼% basis. The proposed issuance of stock contemplates that the way would be prepared for it by a change, from $50 to $1, in the par value of the common. The application explained that this was proposed because the new stock could not be sold for as much as $50 per share.

VIRGINIAN.—To issue, nominally, $6,740,000 of first lien and refunding mortgage bonds, series E, to be held in applicant's treasury as reimbursement for capital expenditures. The bonds, dated December 1, would have a maturity date of December 1, 1980, and their interest rate would be 3⅜%.

Dividends Declared

CANADIAN PACIFIC.—ordinary, 75¢, final, payable in Canadian funds February 29, 1956, to holders of record January 6; 4% non-cumulative preferred, 2%, semiannual, payable February 1, 1956, to holders of record December 30, 1955.

CHICAGO GREAT WESTERN.—common, 25¢, quarterly; year-end, 37½¢; 5% preferred, 62½¢, quarterly; all payable December 31 to holders of record December 21.

CINCINNATI INTER-TERMINAL.—4% preferred, $2, semiannual, payable February 1, 1956, to holders of record January 20.

DETROIT, HILLSDALE & SOUTH WESTERN.—$2, semiannual, payable January 4, 1956, to holders of record December 22.

NORTHERN CENTRAL.—$2, semiannual, payable January 15, 1956, to holders of record December 30.

NORWICH & WORCESTER.—8% preferred, $2, quarterly, payable January 3, 1956, to holders of record December 15.

PIEDMONT & NORTHERN.—$1.25, quarterly; $2.75, extra; both payable December 27 to holders of record December 12.

TEXAS & PACIFIC.—common, $1.25, quarterly; $3, extra; preferred, $1.25, quarterly; all payable December 31 to holders of record December 27.

WABASH.—common, $4.50, payable December 23 to holders of record December 16.

Security Price Averages

	Dec. 19	Prev. Week	Last Year
Average price of 20 representative railway stocks	97.09	98.30	85.73
Average price of 20 representative railway bonds	97.71	97.74	97.46

Supply Trade

Industrial Lift Truck Company, 2900 East Tioga Street, Philadelphia, has been appointed to sell and service, in the Philadelphia area, equipment manufactured by the Industrial Truck Division of **Clark Equipment Company.**

William H. Depperman, formerly public relations director of Olin Industries, Inc., has been appointed to the newly created position of director of public relations of **Link-Belt Company.**

Armco Drainage & Metal Products, Inc., has announced that work will begin immediately on construction of a new 150,000-sq ft plant in Middletown, Ohio, to produce a new line of prefabricated, truss-type steel building, with clear-span widths up to 100 ft.

Joseph Horacek, Jr., has joined **Turco Products, Inc.,** as assistant sales manager, having formerly been associated with **Hercules Powder Company.**

E. W. Hoster, Jr., formerly with **Jones & Laughlin Steel Co.,** has joined the sales staff of **Buckeye**
(Continued on page 43)

For Maximum Revenue and Greater Availability!

Pulpwood Cars For the Progressive FRISCO

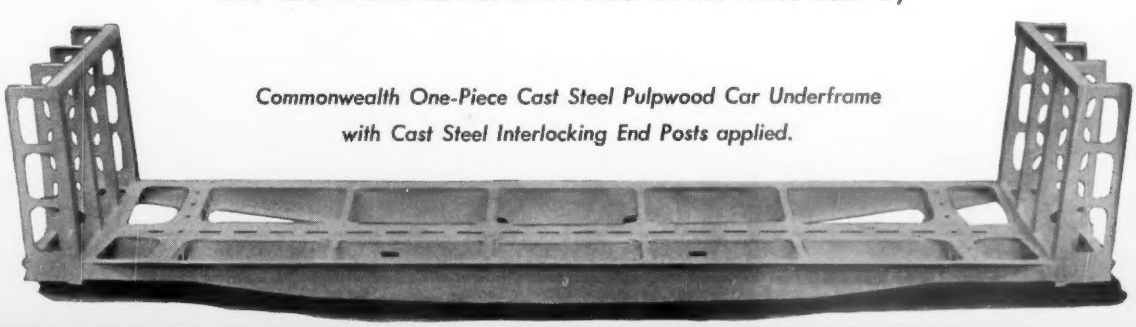
Feature Cast Steel Underframes and Ends

The St. Louis-San Francisco Railway and ten other progressive railroads of America have built several thousands of pulpwood cars with COMMONWEALTH Cast Steel One-Piece Underframes and Upright Ends.

This design pulpwood car has many advantages over converted or other designs of cars. It provides maximum strength at minimum weight, assures longer life, greater availability and maintenance-free service. The one-piece cast steel underframe and upright ends simplify car construction.

These cars—especially designed for maximum revenue loads—are in service on eleven railroads and have proved a most profitable investment.

550 cars now in service or on order on the Frisco Railway



Commonwealth One-Piece Cast Steel Pulpwood Car Underframe with Cast Steel Interlocking End Posts applied.

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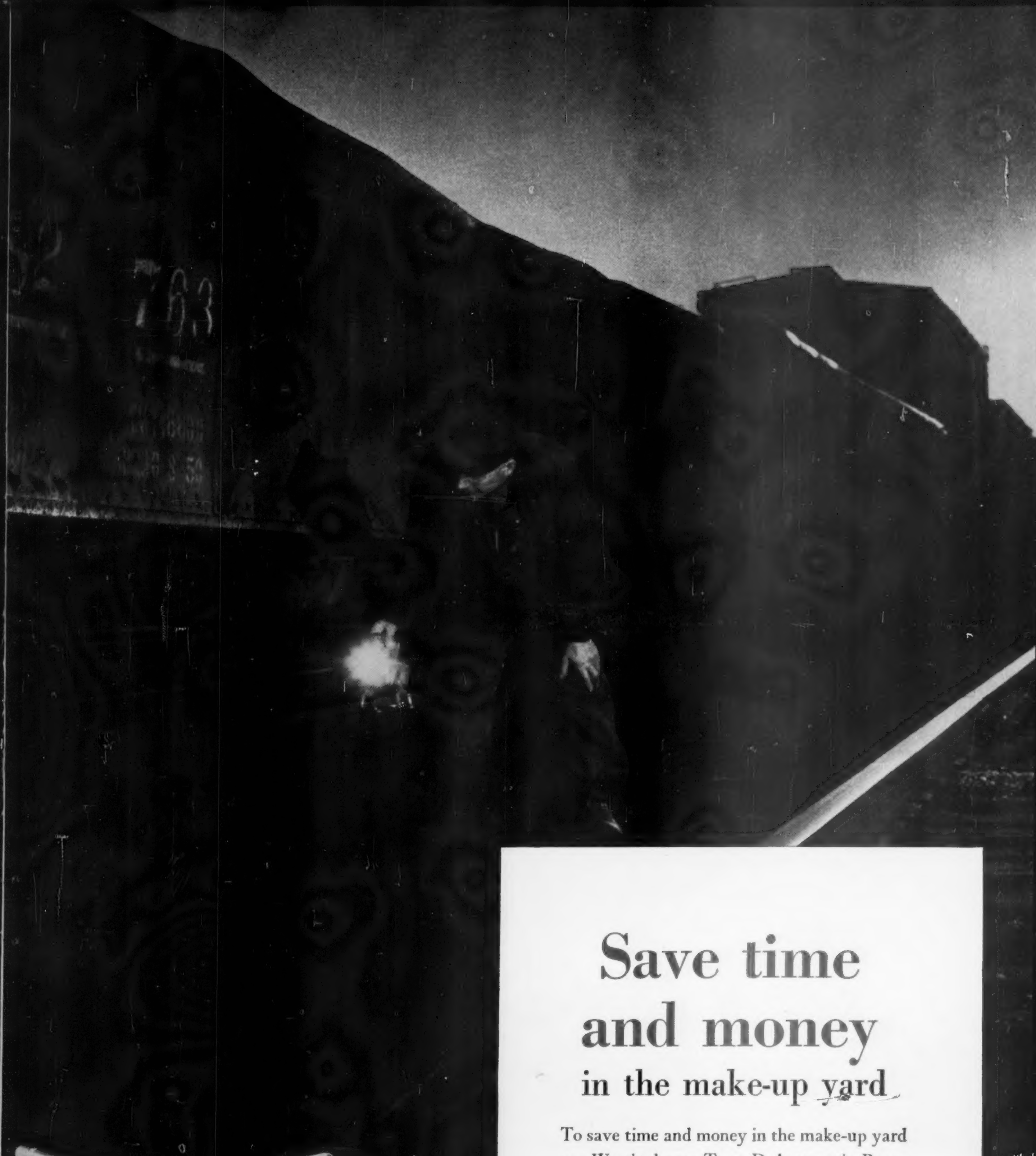
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To save time and money in the make-up yard use Westinghouse Type D Automatic Pneumatic Slack Adjusters.
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PLANNED *on paper*

More than two and a half years ago, this was the planned performance of Train Master in local freight service—"High tractive effort and dynamic brake ratings to handle heaviest local freights . . . the agility to set out and pick up cars . . . perform local switching at interchange points."

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As planned on paper, 2400 horsepower Train Masters provide the right combination of power, traction motor and dynamic braking capacity to handle local freight service—far beyond the ability of a standard road switcher.

Furthermore, TM's replacing standard units at a ratio of 1 to 2 has effected better utilization of *all* motive power on the road. In addition to local freight, versatile Train Master power handles eight other types of service on a three-trick basis, including yard, drag service, symbol freight, humping, passenger and mine drag service.

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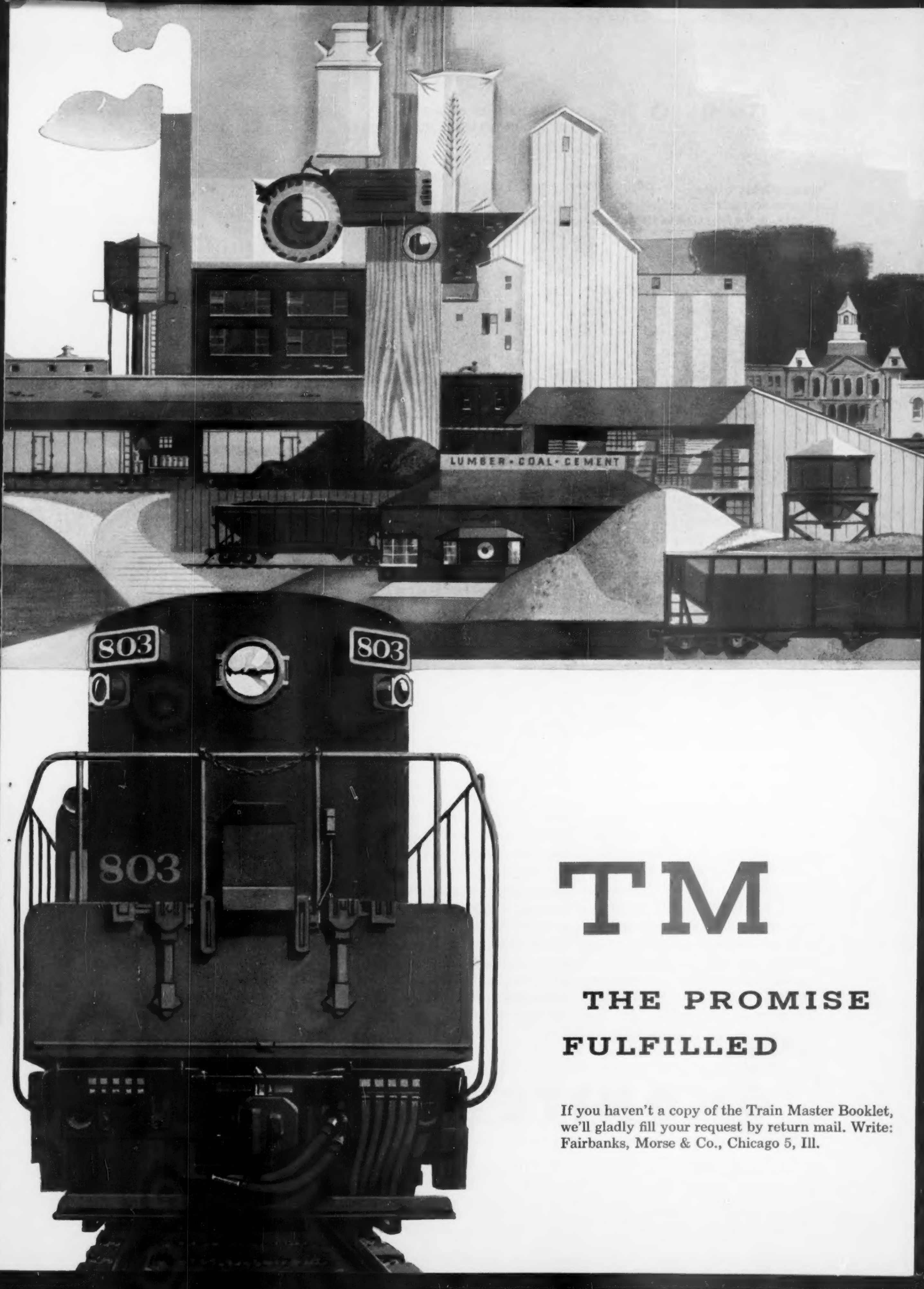
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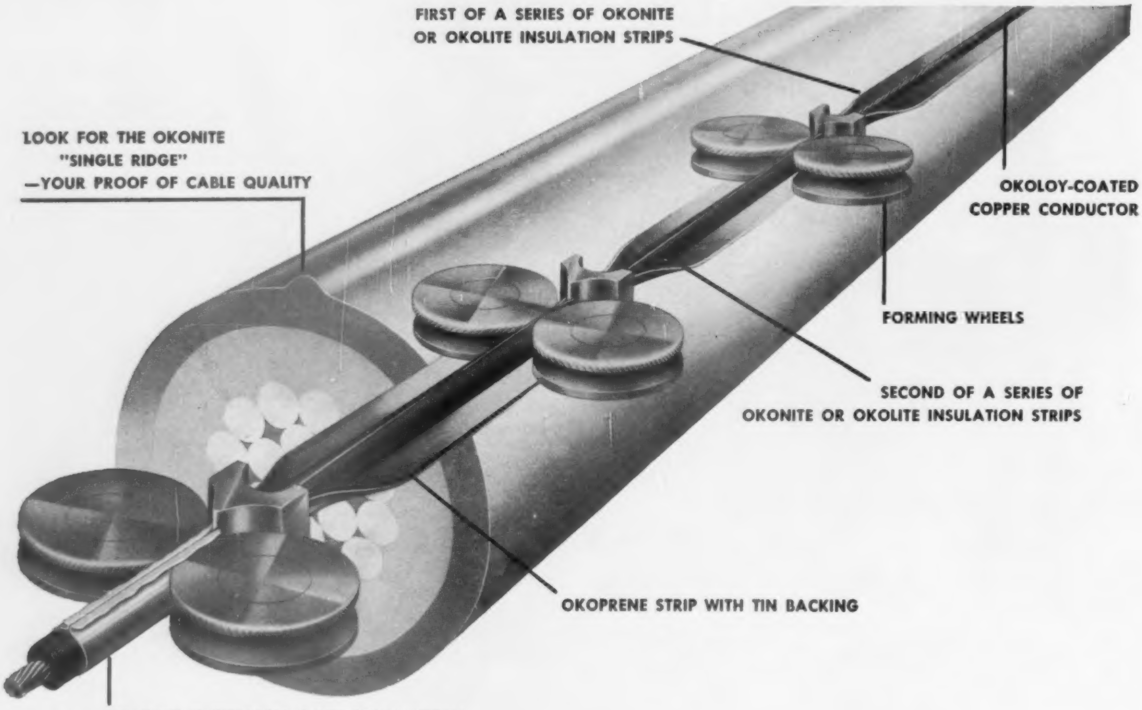


Why the strip-insulating process assures longer cable life

As one of the oldest manufacturers of rubber-insulated cable, Okonite has made cable by all the known methods, namely the extrusion, dip and strip-insulating processes.

Long experience with these methods has convinced Okonite engineers that the strip process produces cables which are longer-lived and more reliable than those made by other methods. The following advantages explain why Okonite-Okoprene and Okolite-Okoprene cables are made by this method.

Perfectly centered conductors. The strip process is the only one that assures perfect centering of conductor. Insulation is uniform in thickness throughout cable length. There are no "thin spots."

Uniform vulcanization. Vulcanizing under pressure in a continuous metal mold makes the insulation tougher, more dense; physical and electrical characteristics are improved.

Single cure. Vulcanizing insulation and sheath in one operation is possible only with the strip process, thus avoiding shortened insulation life. Multiple vulcanization shortens the life of rubber compounds.

Strong bond. Single, simultaneous vulcanization in a metal mold under pressure insures permanent bond between insulation and sheath. This prevents "push backs" during installation, ionization at potentials above 2000 volts and water blisters in wet locations.

Quality control. Unlike any other method, the strip process permits electrical testing and visual inspection of each strip of insulating and sheathing compound both prior to and during application. These controls assure a void-free, uniform, solid dielectric wall.

Cables manufactured by this strip process have outstanding performance records. Next time you purchase cable for any circuit installation, insist on the *one* cable made by the strip-insulating process . . . specify Okonite-Okoprene or Okolite-Okoprene. For a full review of strip-insulating advantages, write for Bulletin RA 1069; The Okonite Company, Passaic, New Jersey.

OKONITE SINCE 1878 ***insulated cables***

3138

Lightweight Trains— Four Builders Look Ahead

The most promising measure now in sight for restoring to the rails passenger-miles and passenger profits is to acquire passenger cars of new designs in the development of which the inhibitions of past practice are abandoned. The goals of the new designs are (1) low first cost, (2) reduced operating and maintenance expense, and (3) higher average speeds without excessive top speeds.

In this issue appear the ideas and designs proposed by four railway equipment builders for meeting these objectives. All four emphasize the importance of keeping weight to a minimum—in order to reduce both first cost and operating costs. All four seek a low center of gravity to permit high average speeds, without discomfort to passengers. In many other respects, the approaches of the four companies differ.

ACF Industries—which has accumulated a million miles of experience in Spain with the Talgo articulated trains of single-axle vehicles and floors close to the rails—has modified the application of the single-axle principle to three-unit articulated coaches. These are completely self-supporting and can operate in either direction with equal facility. "The most significant overall improvement embodied in the new ACF Talgo is what we have termed 'standardized interchangeability' of cars," says John Furrer, manager of the Talgo Project, speaking for ACF. This means that standard carbody shells may contain coach seats, roomettes, bedrooms or various combinations of standard interior units.

In the opinion of the Budd Company, builders should concern themselves with features which are not available in other forms of transportation. The efforts of his company, said A. C. Dean, assistant chief engineer of the company's Railroad Division, "have been along the lines of high-capacity double-deck trains, refinements of conventional equipment with or without emphasis on low center of gravity, improved coach accommodations, and high-performance self-propelled main-line trains." Currently, this company's developments include the "Tubular" train of lightweight low-center-of-gravity coaches for the Pennsylvania.

While, to achieve manufacturing economies and attain maximum reliability, Electro-Motive has given consideration to the use of standard components already in mass production, this policy does not mean adherence to conventional railway rolling-stock standards, but to those associated with the automotive industry. Speaking of the "Aerotrain," B. B. Brownell, chief engineer, and W. H. Harvey, co-ordinator of new products, write: "Here, for the first time, was an opportunity to design an integrated train and match it with the most economical prime mover to attain the ultimate in utilization and economy. . . . The standard GMC 40-passenger intercity highway coach body was adapted to the Aerotrain car with minor modifications, mainly in increased width and in adding railroad vestibules at each end."

Pullman-Standard's "Train X" has single-axle two-unit coaches with dollys under one end of each uncoupled coach. "The design," says T. C. Gray, vice-president engineering, "permits train trailing weights of approximately one third that of the conventional, utilizes relatively low cost electrical equipment, is designed for low contour, low center of gravity and inherent self banking. First cost, operational costs and maintenance should decrease as direct functions of these vital factors.

Here, then, the four current developments for providing lightweight, low-cost, high-speed railway passenger trains are set forth in detail for critical appraisal. Two employ low-contour, articulated cars, with low center of gravity, one with dollys under one end of the uncoupled cars. Another has lightweight low-center-of-gravity cars each carried on two single-axle trucks, but the floor is at approximately conventional height. The fourth employs cars of refined structure, but the bodies are carried on conventional four-wheel trucks and they couple at standard height for interchange with conventional rolling stock. All achieve weights under 1,000 lb per passenger seat, exclusive of motive power.

Among the trains' features are innovations in heating and air-conditioning equipment. The use of head-end power will have an opportunity for a good workout. The adaptability of air-ride suspension to railroad cars will also be determined. The popularity of several novel methods of dispensing food will be tested.

A year's service will probably be enough to indicate the all-important reaction of the traveling public to the quality of service which these trains can render. It will take longer to appraise fully the ultimate economics of ownership of the new equipment. But radical improvements in railroad passenger service are passing out of the stage of talk and are entering that of concrete experience.

THE PROBLEM:

To Recapture Lost Passenger-Miles

Four builders present their design conceptions for the solution—Designs are completed—Trains will be in service on at least four railroads during 1956

The need for passenger rolling stock which can be acquired at much lower prices for equivalent accommodations than conventional cars, which will cost less to operate and maintain, and which will permit the railroads to reduce fares and attract passengers back to the rails, has been the subject of discussion for the past two years.

During that time the specifications for cars or trains to meet this need have been the subject of intensive study. During 1954 a committee of engineers representing five railroads, after investigation here and in Europe, found more approaches to the problem than could be reconciled in a single solution.

In the meantime four builders of railway equipment have been at work formulating objectives and developing designs to meet them. The approach of each in some respects differs from all the others. At a session sponsored by the Railroad Division during the annual meeting of the American Society of Mechanical Engineers at Chicago, November 14 to 18, these four points of view —and the train designs proposed as the best solutions according to each of them—were presented in papers by representatives of ACF Industries, the Budd Company, Electro-Motive Division of General Motors Corporation, and Pullman-Standard Car Manufacturing Company. These papers form the basis of four articles in this issue, one dealing with each of the four builders' designers and objectives.

ACF Takes Off from Talgo

Changes based on a million miles' experience adapt single-axle principle to American conditions

This article is derived from a paper presented to the railroad session of the ASME annual meeting in Chicago by J. R. Furrer, manager, Talgo Project, American Car & Foundry Division of ACF Industries.

The author recounted the experience of the Spanish National Railways with its Talgo trains during the past six years. The Talgo design provides a passenger seat for 50 to 75 per cent less weight per passenger than conventional designs.† The Spanish National Railways estimates that if all its trains were Talgo a saving of more than 60 per cent would be achieved in passenger train operation and maintenance.*

The Talgos, Mr. Furrer said, are capable of cutting as much as 25 per cent off of conventional schedules with relatively little increase in top speeds. This is because the wheels are steered through curves and because of light weight and the low center of gravity. Passengers riding the Talgos on fast schedules, he said, have invariably underestimated speeds.

Mr. Furrer's views are abstracted below.

*For accounts of the Spanish experience with the original Talgo trains, see *Railway Age* October 5, 1953, page 77, and November 30, 1953, page 69.

†The ACF Talgo prototype was described in *Railway Age* April 23, 1949, page 30.

Present Status of Low Center-of-Gravity Lightweight Trains

The "Jet Rocket" (new Talgo) train for the Rock Island built by ACF Industries will be delivered about January 6, 1956. The General Motors lightweight locomotive for this train will be delivered later. One similar train has been ordered by the New Haven. This will be hauled by two Fairbanks-Morse "Speed Merchant" locomotives, one at each end (*Railway Age*, December 5, page 60). A new Talgo train is also on order for the Boston & Maine.

Budd proposes several designs each as an answer to a part of the problem. It is building a newly designed locomotive-drawn lightweight coach train (the "Tubular") for the Pennsylvania. This will be hauled by a conventional locomotive. Budd will furnish the New Haven a self-propelled train of modified RDC cars.

The Electro-Motive Division of General Motors Corporation has one "Aerotrain" already built and is building another. The first train is now running for test purposes on the Rock Island. These trains will be exhibited to the press by the Pennsylvania and New York Central January 5 and after trial service on these railroads will go to the Santa Fe and New Haven for test runs.

Pullman-Standard is building two sets of train equipment, one for the New York Central and one for the New Haven. Lightweight locomotives for these trains are being built by Baldwin-Lima-Hamilton.

—At a Profit

The new ACF Talgo has been specifically designed to meet and fit into American operational requirements while still retaining the basic Talgo principles.

While the original Talgo has achieved a successful record in nearly a million miles of operation, it has been regarded by ACF as a laboratory on wheels. The most significant overall improvement in the new Talgo is what ACF terms "standardized interchangeability" of cars. The new system retains the advantages of articulated trains but eliminates time-consuming multiple connections between cars of this type.

The original ACF Talgo was composed of a series of articulated two-wheel units, each riding "piggyback" on the unit ahead. The fact that each unit had only two wheels at one end made for difficult handling of individual units. Dolly wheels were installed at the unwheeled end of the original Talgo units to give support for handling operations. These dolly wheels were retractable when any individual unit was coupled to an adjoining unit. The dolly-wheel concept was adequate for shop handling of the equipment but was far from adequate for movement in yards or any moderate speed switching.

New Talgo "cars" by contrast are composed of three articulated units semipermanently coupled together. The middle unit of each 3-unit car is a four-wheel unit, while the adjacent end units are two-wheel units riding "piggyback" toward and on the middle unit. By using this system, the 3-unit car is self-supporting at all times, whether coupled to an adjoining car or not, and, therefore, may be handled in yards as any rolling stock is handled. It is only disassembled at intermediate articulated joints for major overhaul.

The extreme ends of each 3-unit car are equipped with quick-disconnect tightlock-type couplers and buff-type diaphragms for passenger protection between cars. The new Talgo cars can be coupled or uncoupled from adjoining Talgo cars with the same ease as conventional equipment.

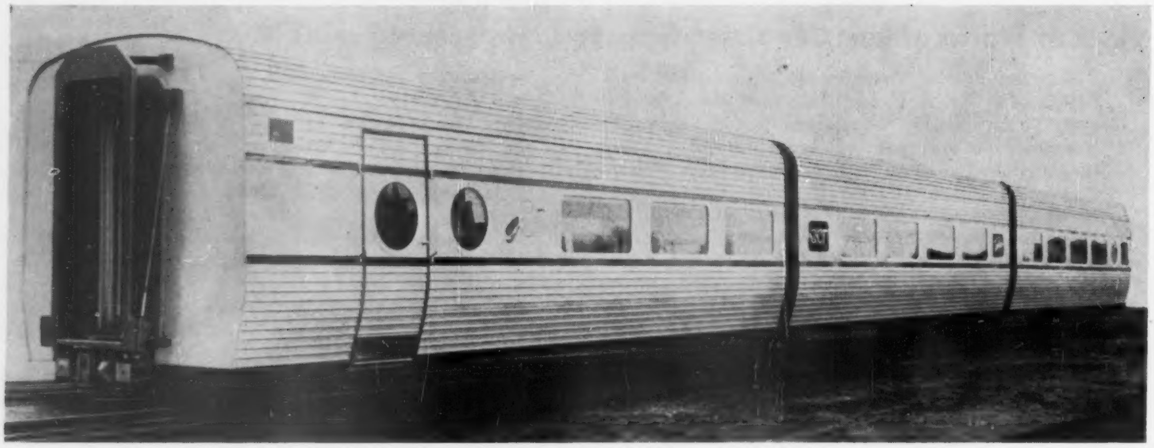
The center line of coupler on the new Talgo cars is 19 in. above the rail. However, they can be readily switched or handled in yards either by switching locomotives equipped with an additional coupler head at the lower level or by using an auxiliary coupler which can be attached to the ends of the cars for the specific purpose of handling Talgo equipment by conventional switching.

Reversibility

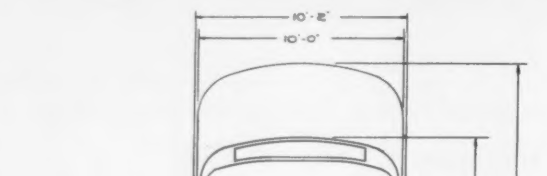
Another significant improvement in making possible "standardized interchangeability" has been the development of a reversible running gear. Like all streamline trains operating with an observation car, the first Talgos were designed to operate in one direction. Operating experience demonstrated, however, that with reversible cars the new Talgos would be more adaptable to a variety of passenger service. For example, commuter service between dead-end stations is now a possibility.

In the original Talgo, each unit had one axle at the rear of the unit which was fixed at right angles to the longitudinal axis of the unit. The front of each unit, in turn, rode piggyback over the rear end of the preceding unit. Each such Talgo car is steered through curves by each preceding car just as trailers on the highways are steered through curves by their tractors. The wheels are steered toward the inside of the curve creating what is broadly known as a negative angle of attack. Conversely, when the original Talgo units were backed up through a curve, the wheels of the units would roll or be forced toward the outside of the curve, attacking the rail with a positive angle of attack. Because of this condition it has not been considered wise to operate the original Talgo equipment through curves at high speeds in the reverse direction and hence the original Talgo is a one-way train as far as high-speed operation is concerned.

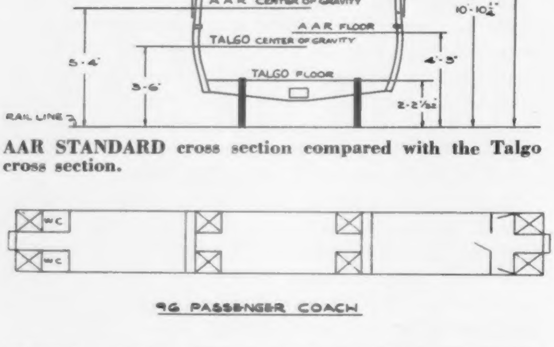
The solution to the problem of non-reversibility has been solved by steering the axles and wheels mechanically so the wheels always attack the rail at what ACF calls a zero angle of attack, no matter whether the train is going forward or backward and no matter what degree of curve the train is passing through. A composite graph shows the relative safety factors against derailment of the original Talgo, the new Talgo and a conventional truck under a specific condition of radius and superelevation. Safety factors against derailment presuppose certain set conditions. In actual railroading, however, there



A THREE-UNIT TALGO COACH. Weight, about 70,000 lb.



AAR STANDARD cross section compared with the Talgo cross section.



TYPICAL INTERIOR of the Talgo standard 3-unit coach.

are many uncontrollable variables—such as irregular track conditions, changing coefficients of friction, and the like. Therefore, when safety factors of this type are applied to specific cases of actual operations, they are primarily useful in foretelling tendencies rather than giving definite conclusions.

When the units of a new type Talgo 3-unit car enter a curve they assume a position of angularity to each other which is directly proportional to the radius of curvature. The angle formed by the units is picked up by a mechanical linkage system between the units and related to the running gears so that the axle forms a right angle to the tangent of the curve. In this way the wheels of the running gear which are perpendicular to the axle are neither rolling toward the inside nor the outside of the curve and have assumed a zero angle of attack. At the extreme ends of the 3-unit cars the angularity related to the curvature of the track is picked up through the tightlock-type coupler which in turn operates the adjacent axle through a simple mechanical linkage system.

While the steering of the wheels on the middle unit of the new 3-unit car is always operable, the steering on the end wheels of the 3-unit car depends on being coupled to an adjoining 3-unit car through a tightlock-type coupler. When uncoupling a 3-unit car from an adjoining car there is no problem in handling the car inasmuch as the end wheels of the 3-unit car are automatically locked at right angles to the longitudinal axis of the car and as such simulate the original Talgo.

The length of the units composing a Talgo 3-unit car is 34 ft 6½ in. The effective wheelbase length is 30 ft 2 in. If individual units were longer and consequent wheelbase was greater, locking the end axles for switching operations would produce an increased angle of attack between the wheels of the locked axle and the rails when rounding sharp yard curves. With this increased angle of attack, tendency to derail is also increased. ACF studies have shown that the practical limit for length of wheel base when locking axles is approximately 30 ft.

Adaptability of Interior Arrangements

The new Talgo 3-unit car has been dimensioned and standardized to accommodate all interior accommodations —coach, parlor car, dining cars of various types, roomettes or bedrooms. It is accepted that by standardizing dimensions and interiors the economic losses resulting from custom building each car or series of cars can be eliminated.

With an established unit length of 34 ft 6½ in. three units make up a "car" with a passenger capacity approxi-

mately equal to a conventional 85-ft car. The new Talgo 3-unit car can seat 84 people on 42-in. seat centers and 96 people on 39- or 36-in. seat centers. In all cases, it is possible to equip the car with rotating reclining seats. It can accommodate 24 roomettes, 12 bedrooms, or various combinations of the two.

Structural Details

The new Talgo car has been dimensioned in an effort to meet all clearance requirements throughout the United States. An overall width of 10 ft 2 in. is permitted by the reduced middle ordinate of the cars on curves.

The cars are designed to meet an 800,000-lb buff load. Associate requirements for sides, ends and roofs also have been maintained.

The underframes, sides and roofs are prefabricated and then assembled into car form. Prefabricated parts when assembled form an integrated tube-like stress-skin structure.

Low-alloy high-tensile steel has been used throughout the underframe and ends. The superstructure is aluminum alloy and the outside skin stainless steel. Extensive use is made of colored plastics in the interiors to minimize maintenance. The scale weight of a complete 3-unit coach in the lightweight condition is approximately 70,000 lb. Weight per passenger is therefore between 700 and 800 lb, or less than half the weight of comparable conventional equipment.

A conventional type air-brake system is used with reservoirs in each 3-unit car. Brake equipment at the wheels is of the internal-expanding automotive type. Experience in Spain as well as recent efficiency and endurance tests on the dynamometer have shown that, with the proper lining composition and proper drum design, satisfactory railroad service can be expected with this type of brake.

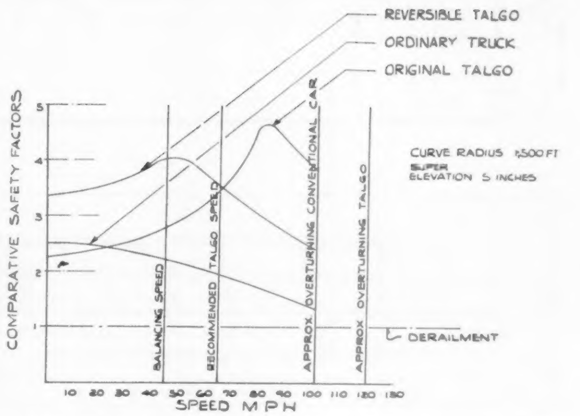
Head-end a-c power at 440-volt, 3-phase, 60-cycle, is train-lined to each 3-unit car to power air conditioning, heating, lighting and so on. Maximum electrical requirements per 3-unit car will approximate 40 kw. A 440-volt system was chosen to minimize transmission difficulty but at the same time to make use of commercially available components.

Each 3-unit car is equipped with its own trickle charger and batteries to handle emergency lighting, thereby providing greater operational flexibility.

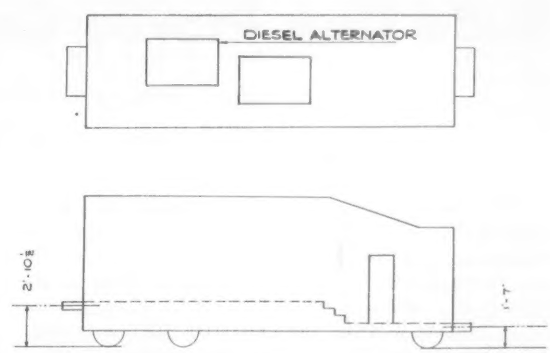
Two electrochemical, freon-charged air-conditioning packages are used per 3-unit car. Each package has a capacity of approximately 4.5 tons, giving a total car capacity of approximately 9 tons. One of the advantages of the two-unit system is to provide partial car air conditioning in the event of failure of any single unit.

The air-conditioning units are installed at the extreme ends of the 3-unit car so as to permit maximum accessibility and replaceability as a package in the event of failure.

Electric heaters are installed in the air-duct system supplemented by additional floor heat in the form of a closed hot-water system heated by a small oil-fired heater. The reason for supplementing the overhead electric heat is to minimize electrical requirements per car thereby reducing electrical transmission requirements for longer trains. Supplementary heat also serves to balance peak electrical requirements during the heating and cooling seasons.



RELATIVE derailment safety factors of the new reversible Talgo, the original Talgo and a car on conventional trucks.



OUTLINE of suggested power car, which adapts low coupler height for use with a conventional locomotive. Based on a conventional 16-car train, head-end power will reduce weight by 100,000 lb.

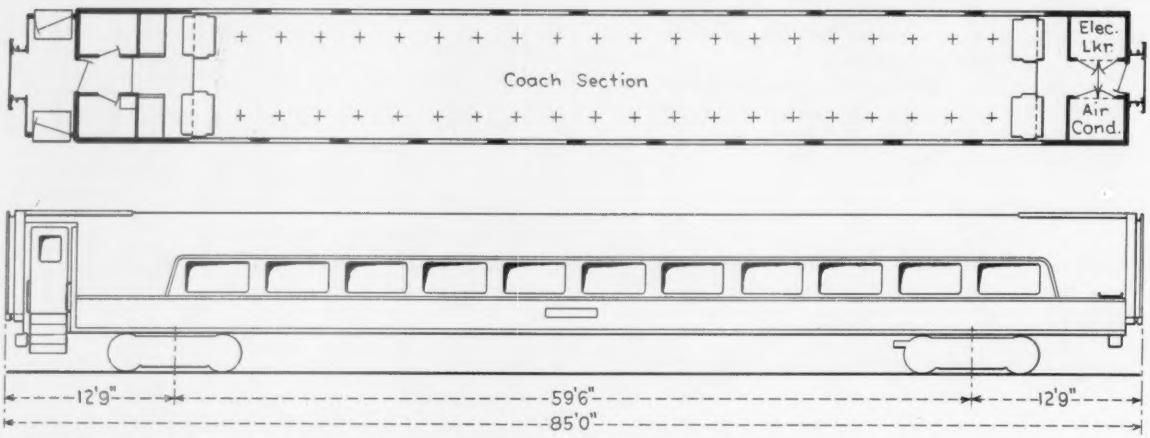
Each 3-unit car has its own water supply with capacity to suit individual requirements.

The floor height of the new Talgo equipment varies between 26 and 28 in. from rail depending on load conditions. This greatly reduced floor height makes for easier entrance and egress requiring only one step to normal low-level platforms. For high station platforms cars may be equipped with the AFC Hi-Low door, whereby retractable steps built into the car permit passengers to step up to or down from high platforms.

How to Power the Talgo

A train of the new 3-unit Talgo cars may be powered by conventional locomotives or by special lightweight locomotives, depending on individual requirements. It may be powered at the front end only or may have double-end power.

If powered by conventional locomotives, an auxiliary power car would carry the necessary diesel generator sets to supply train-line electrical energy to the cars. This car would have a low-level Talgo coupler at one end and a conventional high-level coupler at the other. This not only permits handling by a conventional locomotive but permits the coupling of a complete Talgo train behind a conventional train.



THE LIGHTWEIGHT coach seats 88 with seats spaced 35½ in. Weight, 83,000 lb.

Budd Uses Proved Components

Coupler height remains standard—Weight per seat: Coach, 940 lb; "Tubular" train, including power car, 1,170 lb

This article is abstracted from the ASME paper by A. C. Dean, assistant chief engineer, Railway Division, Budd Company.

*The author said that the most recent phase of the continuing development process of his company began in 1950 with the advent of the RDC unit. This is intended for branch lines, short hauls and commuter service. It is operating on scheduled runs up to 1,000 miles.**

*Other Budd developments since that time include the Gallery car†, a double-deck, high-capacity commuter car of low cost per seat; the full-length dome car‡, a high-capacity luxury car; the high-level train**, with the principal passenger area above the various facilities below; the high-speed, self-propelled train, a modification of the RDC to supply a high-speed main-line service requiring short trains at low cost; a lightweight coach weighing 75,000 to 83,000 lb, depending on whether head-end power is used; a "tubular" train with depressed floor, in which the cars are to have weights similar to the lightweight coaches; and the Siesta coach††, a high capacity car furnishing low cost sleeping accommodations.*

That portion of the author's paper dealing with the lightweight coach, the tubular train and the self-propelled high-speed train is condensed below.

*For a description of the RDC car see *Railway Age* September 17, 1949, page 496.

†The Burlington gallery cars are described in *Railway Age* October 21, 1950, page 20.

‡See *Railway Age* April 5, 1954, page 58.

**The prototype cars were described in *Railway Age* September 13, 1954, page 24.

††The Siesta accomodations were illustrated in *Railway Age* June 1, 1953, page 59.

BUDD DESIGN LIGHTWEIGHT COACH

Type of car—Coach, Lightweight	Seat spacing—35½ in.
Length—85 ft	Light weight—83,000 lb
Height—11 ft 9 in.	Center of gravity—43½ in.
Capacity—88	Weight per passenger—940 lb

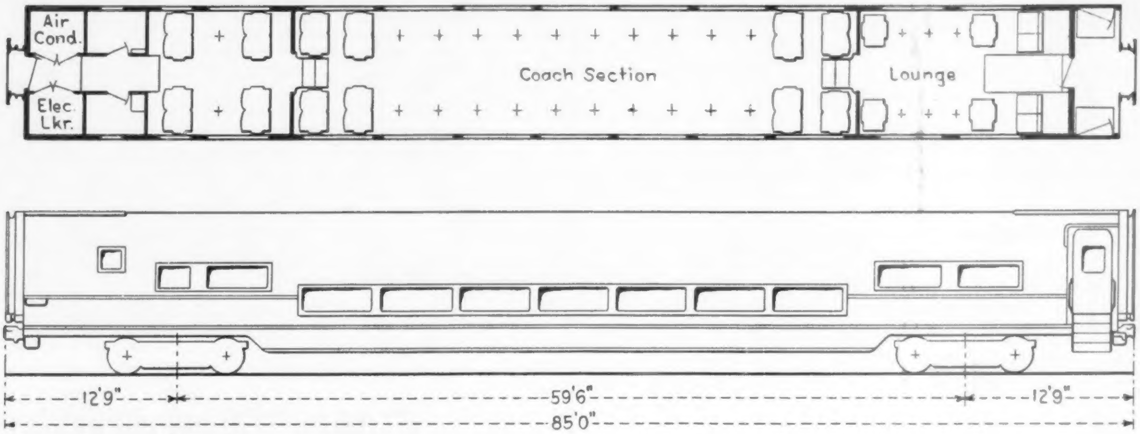
The Budd lightweight coach design fundamentally is a refinement of present lightweight coaches. This car has been lowered to 11 ft 9 in. overall height and 43 in. floor height, as these dimensions will permit the installation of a wide variety of passenger accommodations and under-floor equipment. It is directly comparable to a conventional coach seating 86 passengers, weighing 115,000 to 130,000 lb (1,300-1,500 lb per passenger).

With equivalent mechanical equipment, this car will weigh 83,000 lb, resulting in a reduction from around 1,500 lb per passenger to 940 lb per passenger. Where head-end auxiliary power and steam heat are available, the weight is further reduced to 75,000 lb, at a weight per passenger of 850 lb with center of gravity at 47 in. The head-end auxiliary power, either in a lead car or locomotive, is not included in this figure.

Interior decorations can be anything desired, but preferably simple, for a minimum cost per seat.

The structure has some margin of safety over the 300,000 lb buff resistance. The construction is similar to present-day stainless-steel coaches, including the use of a conventional center sill.

The equipment has been designed on the basis of standard auxiliary generator, batteries and other 64-volt devices with an alternate for head-end power at 440 volts a-c. Eight tons of air conditioning capacity is provided, with the evaporator in a locker at one end of the car. Steam heat is provided in both alternates for the lowest cost and weight per train. Vestibules are at conventional height with a ramp down from the 50⅜-in. platform height to a floor level of 43 in.



LIGHTWEIGHT depressed-center coach of the Pennsylvania "Tubular" train. Seats for 82, including the lounge. Weight, 82,000 lb.

The running gear consists of conventional trucks of 8 ft 6 in. wheelbase, with 34 in. wheels, 5 in. by 9 in. journals and disk brakes.

PENNSYLVANIA LIGHTWEIGHT TUBULAR TRAIN

	Coach	*Head-end power car*
Length, ft	85	53
Height, ft-in.	11-9	11-9
Capacity, passengers	82	....
Seat spacing, in.	35½	....
Light weight, lb	82,000	97,000
Center of gravity, in.	42	50
Weight per passenger, lb	1,000	....

The coaches in this train will replace conventional coaches for intermediate distance travel. The conventional cars have about the same capacity but weigh 115,000 to 130,000 lb in modern equipment and 145,000 lb in rebuilt heavyweight equipment. The train under construction will consist of seven coaches, a head-end power car including a food-preparation center, and conventional electric or diesel locomotive. Excluding the locomotive, this train will weigh 1,170 lb per passenger as compared to an equivalent train of modern standard equipment weighing up to 1,585 lb per passenger or heavyweight equipment at 1,770 lb per passenger. Expensive decorations will be avoided.

The structure is designed to full AAR strength level consisting of conventional end-frame and side-frame construction. No center sill is used because the abrupt depression of the floor between trucks to a floor height of 2 ft above the rail would require such eccentricity in a center sill as to involve a prohibitive amount of weight. The vertical beam to carry the load above and below is not considered practical. It was decided, therefore, to utilize the strong through side sills as the buff resisting members. A fairly conventional underframe is used with shear panels in the floor area above the trucks to transmit these loads to the side sills.

The auxiliary power is supplied by a head-end power car providing two diesel alternators, each capable of supplying 265 kw of 440-volt, 3-phase a-c power. This power capacity is necessitated by the use of electric heat. Enough power is provided for up to ten coaches for all except extreme low temperatures seldom encountered in this country.

Eight tons of air conditioning capacity is provided in each coach with equipment about normal except that it is powered with a-c motors. The compressors and condenser equipment are placed below the floor as usual, in the space between truck and end of car. Evaporator and blower are mounted in a locker above the floor instead of overhead.

Electric heating is used to minimize the maintenance and steam losses occasioned by steam heat, although it does result in some increase in train weight and train cost.

The depressed floor between trucks permits a low center of gravity of about 42 in. with little weight sacrifice.

A smoking lounge is provided at one end of each coach. Platforms are at conventional height. A feature of the interior is the elimination of window curtains and the use of glass with graduated tinting to control glare.

The running gear consists of 4-wheel 5-in. by 9 in. equalized trucks with outside swing hangers, large central-bearings, 33-in. or 34-in. wheels and disk brakes. The swing hangers are kept as long as possible for soft lateral restraint.

The specifications for these cars emphasize light weight, low center of gravity, low cost per seat and low maintenance. Plastic interiors and stainless-steel structure contribute to low maintenance cost. The high capacity permits a low cost per seat and the light weight is achieved by use of high-tensile stainless-steel structure.

NEW HAVEN SELF-PROPELLED TRAIN

	Intermediate coach	*Train of six cars*
Length, ft	85	510
Height, ft-in.	12-5⅜	12-5⅜
Capacity	82	456
Seat spacing, in.	39½	39½
Light weight (not including electric traction), lb	109,500	658,000
Center of gravity, in.	51	51
Weight per passenger (including motive power), lb	1,335	1,440

This train is perhaps a logical development from the RDC which has been giving excellent performance in single-car or short-train consists in both branch-line and main-line service. By redesigning the front and rear ends of the train to provide a more or less conventional locomotive cab at each end, the unit becomes more suitable for regular high-speed main-line operation.

For Intermediate Distances

This train is intended for intermediate-distance travel. It would weigh 1,440 lb per passenger as compared to the conventional train at some 2,000 lb per passenger. This difference is more striking if the motive power is made more equal in horsepower per ton, in which case the conventional train would weigh 2,700 lb per passenger.

It is intended for intermediate-distance high-speed performance, with fast acceleration and deceleration.

The basic car is suitable for a variety of accommodations, including a complete variety of sleeping accommodations. The structure is designed to full AAR strength requirements, being largely high-tensile stainless-steel, similar to the RDC units. The end sill is reinforced to provide strengths about consistent with locomotive practice to minimize damage in case of grade crossing and similar accidents. The equipment is typical of the RDC.

The train is regeared to permit operation at 110 mph at 2,000 engine rpm. As the horsepower required per car reduces rapidly as the number of cars in the train is increased, the RDC power plants will permit this speed as long as three or more cars are in the train.

Auxiliary power is 64-volt as in the case of the RDC. Eight tons of air conditioning capacity is provided with compressor and condenser located under floor with conventional overhead evaporator, duct, and distribution.

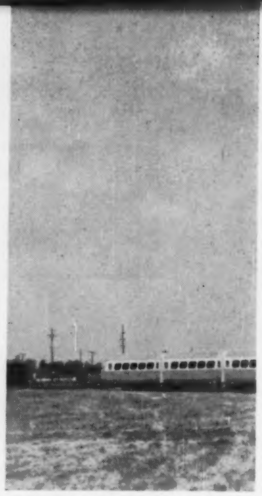
The heating, as in the case of the RDC, is by engine-jacket cooling water. Each car has two Detroit Diesel 6-110 diesel engines with Allison torque-converter transmissions. The latest engines are now rated at 300 hp at 2,000 rpm.

Electric Traction Motors

For operation in New York City tunnels and stations, auxiliary electric truckmounted traction motors are provided. Remote starting of the diesels permits them to be started from the cab or from each car. The electric traction motors and controls add approximately 5,000 lb per car.

This train concept raises the question of operating cost with a multiplicity of engines. RDC operation has demonstrated considerable improvement over locomotive-drawn costs for short trains. This improvement diminishes as the train becomes longer, becoming equal at roughly a 4- or 5-car train where performance is not important.

For equal performance, approximately measured by equal horsepower per ton, the advantage enjoyed by the self-propelled train holds, probably for all useful lengths.



THE "AEROTRAIN" was visited by more than two and a quarter million persons during the 26 days of General Motors' "Powerama" at Chicago in September 1955.

GM's "Aerotrain,"

This article is a condensation of the ASME paper by two representatives of the Electro-Motive Division of General Motors Corporation, B. B. Brownell, chief engineer, and W. H. Harvey, coordinator of new products.

The board objective for the General Motors "Aerotrain" were determined by conversations between various railroad presidents and N. C. Dezendorf, vice-president of General Motors and general manager of Electro-Motive Division. They asked Mr. Dezendorf for suggestions General Motors might have for new passenger equipment that would reduce equipment investment and reduce operating and maintenance costs; lower the center of gravity and increase average speed; improve riding comfort; and make possible lower fares to attract greater passenger traffic.

Three overall objectives were set up as guides for the design:

1. The locomotive and ten cars should be held as near as possible to 600,000 lb gross weight.
2. Both investment and operating costs of the new train should be reduced. The objective was to design coaches which could be built for approximately half the cost of conventional railroad equipment.
3. The styling should dramatize the train as an entirely new concept in passenger train equipment and heighten public interest in it.

Here, for the first time, was an opportunity to design an integrated train and match it with the most economical prime mover to obtain the ultimate in utilization and economy. An auxiliary power source in the locomotive supplies current not only for train lighting, but for individual heating and air-conditioning units in each car as well. Elimination of steam lines makes possible the use of an automatic coupler on the cars which makes all necessary electrical and air connections as the cars are coupled.

Freedom from problems of interchange permitted the design of an entirely new air brake system with substantial reductions in cost and weight as fundamental objectives.

Since total weight of the complete train was limited to approximately 600,000 lb, design of the "Aerotrain" locomotive was started by determining the minimum

a New Concept

Electro-Motive Division's design is new from pilot to tail lights — Objectives: 400 passengers, 600,000 lb; conventional cost reduced by half; styling to dramatize the new departures

horsepower needed to pull this weight at a maximum speed of 102 mph.

The 12-567C engine, delivering 1,200 hp for traction, was found to be adequate to meet the performance requirements. This meant that the single locomotive unit needed to haul the 10-coach, 400-passenger train would be, in effect, half of a model E9 (the standard General Motors 2,400-hp diesel passenger locomotive unit powered by two 12-cylinder, 567C engines).

It was also determined that two Electro-Motive D-37 traction motors could carry the load, and this in turn led to design of the rear locomotive truck as a single idler axle which contributed to overall weight reduction.

The locomotive employs proved components of construction to the greatest extent feasible. The underframe consists of two fishbelly I-beam center sills which serve as main carrying members for the carbody, cab and equipment. Two side sills, supported by the center sills, partially support the cab and carbody framing and skirt arrangements. Coupler pockets are welded to built-up platform constructions between the center sills. The complete underframe assembly is of all-welded construction. Outside finish consists of a light-gage sheet steel welded over a structural framework.

Main propulsion equipment is the 12-567C diesel engine, standard Electro-Motive D-15E d-c generator, and two D-37 traction motors on the front two-axle truck. The propulsion engine and the main generator are placed in the depressed fishbelly section of the underframe to lower the center of gravity.

In the nose of the locomotive two auxiliary power units are mounted, supplying electric power for train lighting, heating and air conditioning. They are six-cylinder Model 6-71 Detroit Diesel engines powering 440-volt, 3-phase, 60-cycle, Delco a-c generators.

Several improvements in control devices have been incorporated in the Aerotrain locomotive. The transition-control relay is modified to keep the power higher during very rapid acceleration, and to load the power plant more effectively, in areas of moderate- to high-speed operation at reduced throttle. Motor cutout control has been improved so that, with one traction motor cut out, practically full power capacity of the other motor can be utilized over a relatively wide speed range, while, at the same time, current will be limited to a reasonable value for starting and accelerating.

Car Design Factors

In designing the cars, Electro-Motive engineers started with a strong steel underframe that would carry strength right out to the sides. Underfloor compartments provide space for heavy baggage and housing for the individual heating and air-conditioning units and other equipment.

The standard GMC 40-passenger intercity-type highway-coach body was adapted to the Aerotrain car with minor modification, mainly in increased width and in adding railroad vestibules at each end. This body, susceptible to fast production with all standard type components, satisfies the weight problem and also meets safety requirements.

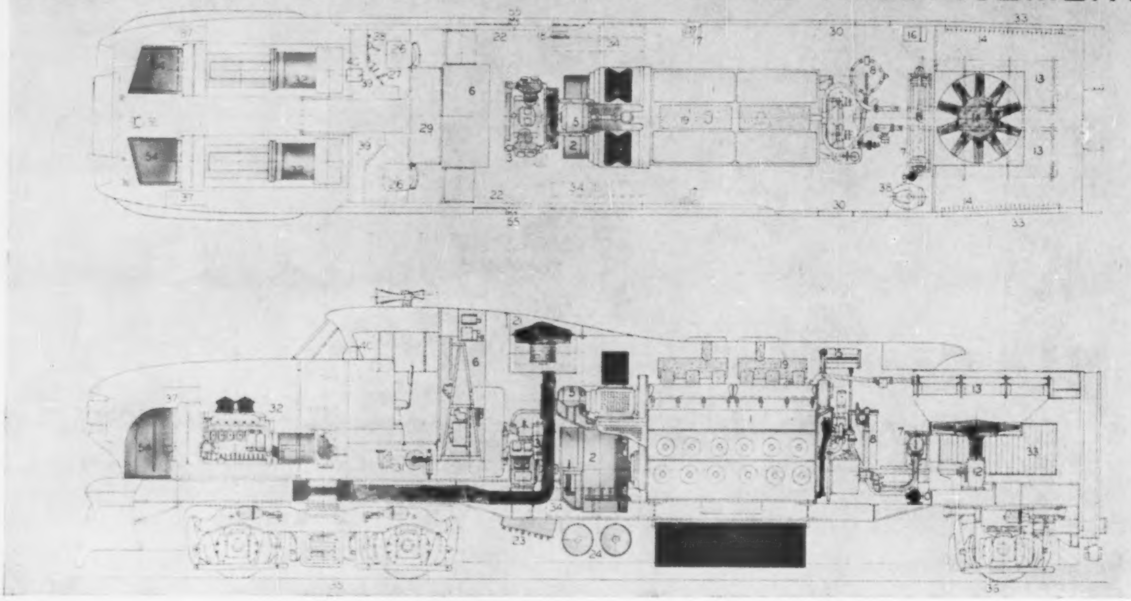
To achieve improved riding comfort, the patented General Motors Truck & Coach Division "air-ride" was selected and adapted to railroad use.

In consideration of the objective of reducing maintenance costs, the cars were designed as simply as possible with smooth exteriors and smooth interiors, reducing the cleaning problem to a minimum.

Each car is 40 ft long, 9 ft 6 in. wide, and 10 ft 9 in. high. The floor is 43 in. above the rail—nearly as high as conventional railroad coaches. The center of gravity, however, is only 45 in. above the rail, close to that of other lightweight trains. Wheelbase of the four-wheel undercarriage is 25 ft 3 in. Weight of an empty car with complete supplies is approximately 38,000 lb.

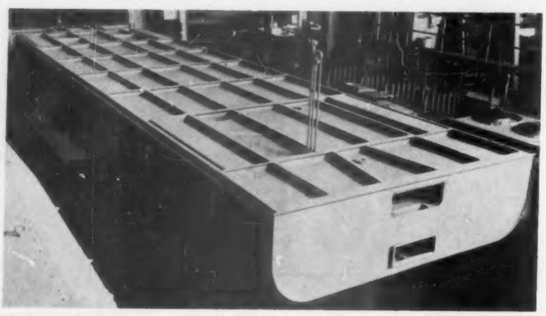
The doors and steps of the vestibule at the front of each coach are arranged so the entrances will serve either high or low station platforms. At the rear end of the car a lavatory is installed on the right side. Across the aisle, space is provided for a galley or snack bar for serving

AEROTRAIN LOCOMOTIVE GENERAL ARRANGEMENT



THE INTERIOR ARRANGEMENT of the "Aerotrain" locomotive is entirely new.

1. Engine—EMD Model 12-567C
2. Generator—EMD Model D15E
3. Air Compressor
4. Traction Motor Blower
5. Aux. Generator
6. Electrical Control Cabinet
7. Lube Oil Cooler
8. Lube Oil Filter
9. Fuel Filter
10. Fuel Pump
11. Cooling Fan
12. Fan Drive Gear Box
13. Radiators
14. Shutters
15. Water Tank
16. Load Regulator
17. Fuel Tank Vent
18. Hand Brake
19. Exhaust Manifold
20. Air Filter
21. Dynamic Brake
22. Body Side Door
23. Compressor After Cooler
24. Main Air Reservoir
25. Fuel Tank
26. Cab Seat
27. Controller
28. Brake Valve
29. Trap Door
30. Maintainence Doors
31. Air Brake Equipment
32. Generating Set—Model 6-71
33. Engine Cooling Air Intake
34. Batteries
35. Power Truck
36. Idler Truck
37. Sand Boxes
38. Hopper
39. Cab Heater
40. Speed Indicator
54. Aux. Engine Air Duct
55. Fire Extinguishers



The underframe of the "Aerotrain" cars has deep transverse members. Three of the underfloor spaces are finished as luggage compartments. One houses the air-conditioning equipment.

light meals or refreshments. In the experimental trains, four cars are equipped with different types of service to try the reception of each.

Electropneumatic sliding doors controlled by a sensitive door edge are set in the vestibule bulkhead at the front end and in the rear end bulkhead. Inner and outer diaphragms are applied to each end of the car.

The passenger compartment of the GM car has 40 seats of the modern reclining type. They are rubber filled with changeable nylon covers, washable headrests, footrests, and ashtrays in the arm rests. Seat spacing is 35 in. Package racks on each side of the car above the seats provide approximately 140 cu ft of storage space.

Interior lighting is by a single row of fluorescent lights running the length of the car over the center of the aisle. Aisle lights are also provided on the seats. Reading lights for each seat are located under the package racks.

The interior finish is attractive and durable, requiring a minimum of painting and maintenance.

The car for the new Aerotrain comprises a replaceable body, which is very low in first cost compared to conventional cars. Undercarriage is expected to last many years with a minimum of maintenance. General Motors expects that when the car requires overhaul (about every seven years in the case of conventional cars), the old body can be replaced with a new one, including all the modern advances then required, for less money per passenger than is now spent for repairing and refurbishing conventional type cars.

Air-Ride System

Eight air bellows, mounted four on each single-axle truck, support the entire weight of the car. The bellows are attached to air boxes, built into the underframe of the car, which are charged with air from the train supply line.

The air-ride system consists basically of two separate charging lines, a signal device, air reservoir and ride control devices along with the necessary limit valves and check valves. The arrangement is shown schematically in a diagram.

Initial charging of the air bellows is through a line which bypasses the 75-psi limit valve, air reservoir and ride control valves. A limit valve in the line limits its charging pressure to 30 psi. The line assures an initial charge in the air bellows before the air brake system at 60 psi is charged. It also acts as a lower limit for the air-bellows pressure for normal operation. A relay air valve connected between this line and the signal line operates a signal in the locomotive whenever the bellows pressure is below 25 psi.

The main charging of the air bellows and ride control devices is done through the air-reservoir line. A 75-psi limit valve in the line keeps this system from drawing air until the brake system is fully charged. The air reservoir supplies air to the system when pressure in the train supply line is reduced, as in a full brake application. A second limit valve, after the air reservoir, limits the maximum charge in the air bellows to 35 psi.

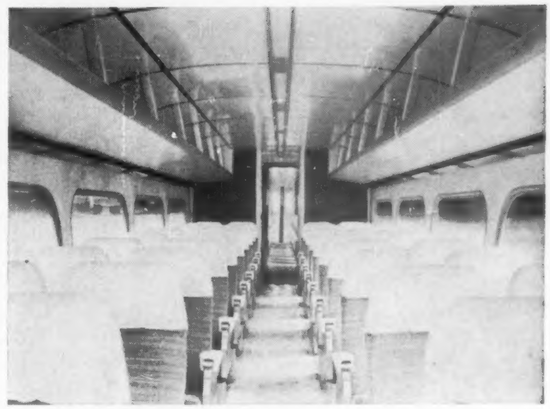
The air pressure in the bellows is controlled between the upper and lower limits by the ride-control valves, which act to hold the height of the carbody above the rail at a constant value. When the load on the car is increased, the valves admit more air to the bellows; and when the load is decreased, the valves exhaust air from the bellows. Three valves are used, two at the front corners of the car and one at the center rear. This gives, in effect, a three point suspension control which holds the car parallel with the rails, both longitudinally and laterally. A hydraulic dashpot is incorporated in the ride control valves to delay the pneumatic response. This allows normal springing to take place without constant readjustment of the bellows air pressures.

The Aerotrain has a unique air conditioning and heating system, designed by Electro-Motive engineers, which eliminates the need for a steam generator in the locomotive and the trainlined steam supply required with conventional equipment. In each lightweight car a self-contained air conditioning system is installed. The system includes a 5-ton Frigidaire refrigeration unit with a reheat cycle for dehumidification and temperature control.

Located in the equipment compartment in front of the rear wheel well on the car undercarriage, the system is controlled from a panel in the snack-bar compartment of the car and may be manually set for either heating or cooling cycles or for straight ventilation.

Conditioned air is distributed through longitudinal ducts along each side of the carbody at the floor line and thence to vertical ducts which disperse the air through openings at the base of the windows. Outlets are provided in the longitudinal ducts for distribution of air over the floor. Air is returned to the conditioning unit through ducts in the floor. Twenty per cent make-up air is obtained through grills in the roof and is transmitted to the air conditioner through vertical ducts in the rear bulkhead of the passenger compartment. The system has a total air flow capacity of 2,070 cfm.

Heating is supplied as required by a water-to-air heat-transfer coil. During the heating cycle, heat is supplied to the water by an 8-kw electric immersion heater of 28,300 Btu per hr capacity. When more heat is required, the entire load is taken over by an oil-fired heater of 150,000 Btu per hr capacity. Car temperature is controlled by a thermostatically controlled bypass valve which varies the flow of hot water through the heat-transfer coils.



THE PASSENGER Compartment.

During the cooling cycle, the refrigeration unit runs continuously at full capacity. Temperature control is obtained by reheating the refrigerated air with the same hot water system used in the heating cycle. In this case, however, heat for the water is obtained from the hot freon leaving the compressor by means of a precondenser. The amount of reheating is controlled by bypassing the water flow as necessary, and the same temperature control thermostat is used for both heating and cooling cycles.

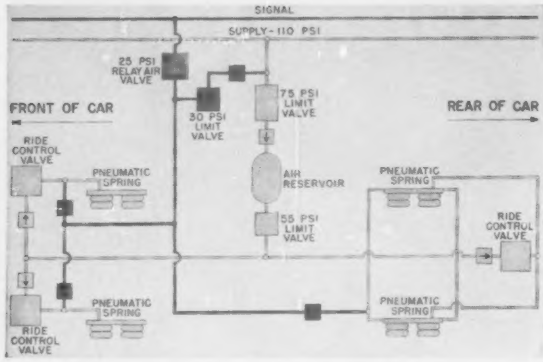
Air-Brake System

The fact that the locomotive and cars are to be operated as a unit and coupled with automatic couplers permitted simpification of the air-brake system, resulting in significant cost and weight savings.

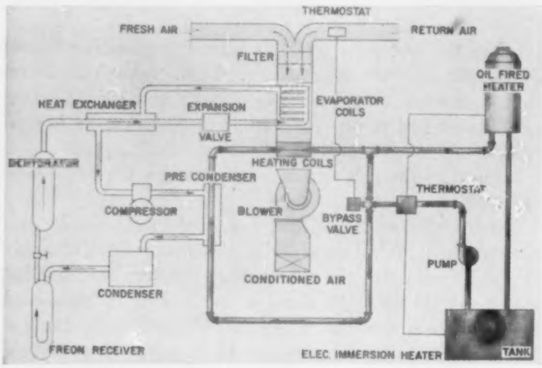
To further reduce weight and cost, non-metallic or plastic brake shoes were chosen for the Aerotrain. These shoes require only one-third the force of cast-iron shoes to produce a given braking action due to higher friction values obtainable. This made possible the use of much smaller brake cylinders than would otherwise have been required.

The arrangement is essentially a straight-air brake with variations that permit the operation of two to twelve cars in multiple service. Break-in-two protection is provided in event of the train's parting. Arrangements also have been made so that a standard locomotive could haul the Aerotrain in an emergency and maintain adequate air-brake control.

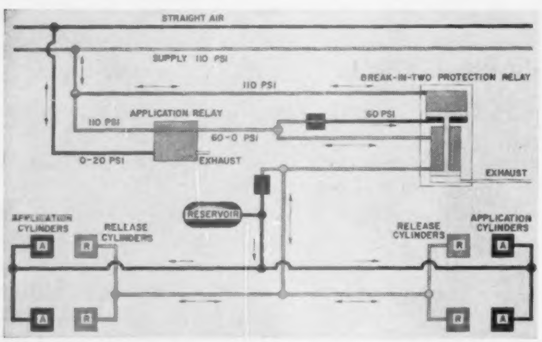
There are two principal circuits in the system which are trainlined through all cars: the straight-air line and the supply line. There is also a conventional signal line. Air is supplied to the cars at 110 psi through the supply line to the application relay and break-in-two protection relay. The straight-air line controls the application relay on each car. This relay regulates the maximum air pressure supplied to the release and application brake cylinders



SCHEMATIC DIAGRAM of the air-ride system.



SCHEMATIC ARRANGEMENT of the air-conditioning system. Heating and cooling are closely inter-related.



BRAKE APPLICATION and release are controlled by pressure in the straight-air line. A break in the supply line initiates a full application.

and the volume reservoir. This pressure is predetermined, depending upon the retarding rate desired, and is nominally 60 pounds.

The release and application cylinders are of the same area and mounted so as to oppose each other in operating the brake linkage. The force of the release cylinder is applied through a slightly longer lever arm than that of the application cylinder, so that when the pressures in each are equal, the brakes are released.

Operation of the control handle in the locomotive allows air pressure to develop in the straight-air line. This reduces the regulated air pressure which the relay valve supplies to the release cylinders at the rate of 3 psi reduction for every 1 psi increase in the straight air pressure. Pressure in the application cylinders and volume reservoir remains the same because of a check valve in the line. Thus, the brakes are applied with a force proportional to the pressure differential between the release and application cylinders which is dependent upon the reduction made.

The time required for application or release has been kept to a minimum on the Aerotrain by the arrangement of equipment and small volumes of the brake cylinders. A full application is in effect 3.75 seconds after movement of the brake-valve handle. A service application of 45 psi is in effect within five seconds on the tenth car.

Testing the Cars

Testing of various components of the Aerotrain was carried on as development progressed. When the first car underframe was built, it was provided with a shell upper structure and was stress tested. The structure was loaded vertically up to 200 per cent of normal with no indications of abnormally high stress. The car was also loaded with 600,000 lb buff load, applied longitudinally on the end of the car, without showing signs of distress.

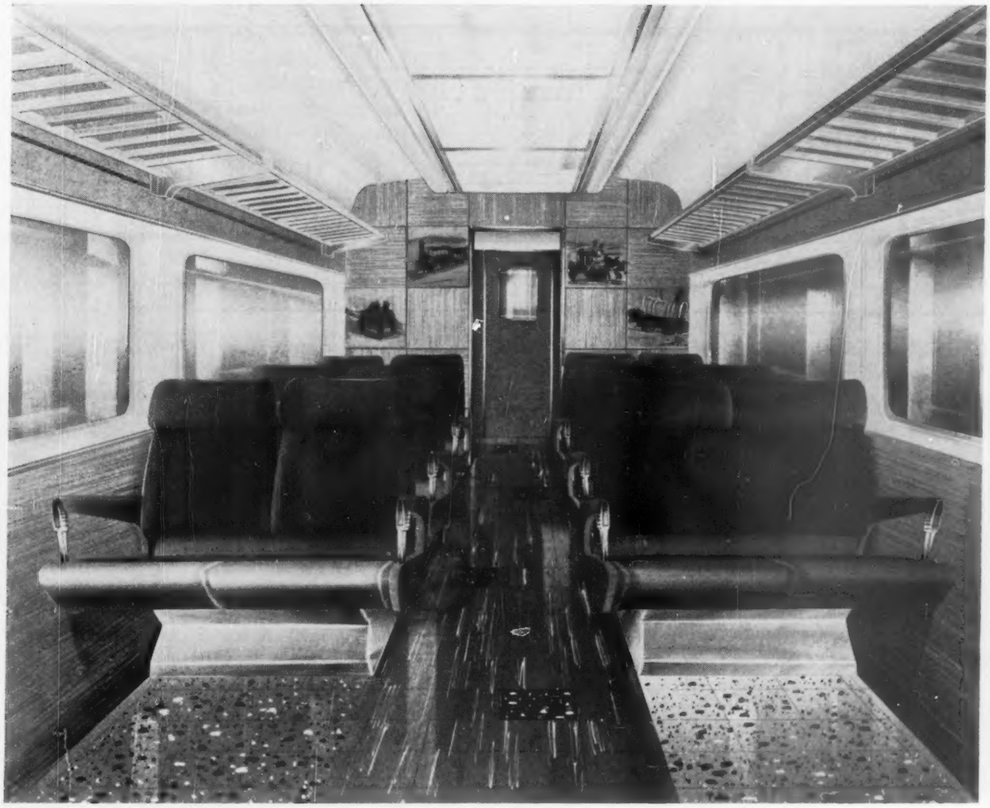
After the stress tests, the car was provided with trucks, windows and doors and equiped with instrumentation for road testing. For this purpose, pickups, connected to an oscillograph, were provided for measuring the vertical deflections between the trucks and carbody. A gyroscopic instrument was installed for recording the roll of the car. Three-way ride recorders were utilized to record lateral and vertical shocks and, in addition, a television set with a camera focused on the contact point between wheel and rail was used to show how the car was tracking.

To insure that the road test gave a true picture of the performance of the car, it was coupled in between two underframes riding on the same kind of trucks and ballasted to the same weight as the test car. Tests of this train were run on railroads at speeds up to 100 miles per hour. The first test runs were by no means perfect. Subsequently, however, improvements were made, largely in the air suspension system and the accompanying shock absorbers, which greatly improved riding qualities. Experimental work in this line is being continued.

Because of the novelty of the four-wheel suspension in high-speed service, the original test train was provided with means of guiding the axles around corners. Road testing proved, however, that this arrangement was not necessary; so in the interests of simplicity it was eliminated.

General Motors emphasizes that the Aerotrain is an experimental train and development work has not yet been completed. Achievement of the results indicated in this paper must be proved by exhaustive tests. Two identical Aerotrains are scheduled to begin demonstrations and tests on the Pennsylvania and New York Central. Thereafter one train will be made available to eastern railroads, beginning with the New Haven, and the other to western railroads, commencing with the Santa Fe.

It is believed that a year or more will be required to complete these tests. At the end of that time, performance, economies, and customer appeal characteristics should be well established.



ARTIST'S RENDERING of a typical "Train X" interior.

Pullman-Standard's "Train X"

One double-axle and eight single-axle units seat 392 persons at less than 700 lb per seat, exclusive of locomotive and head-end power

This article summarizes an ASME paper by T.C. Gray, vice-president-engineering, of Pullman-Standard Car Manufacturing Company.

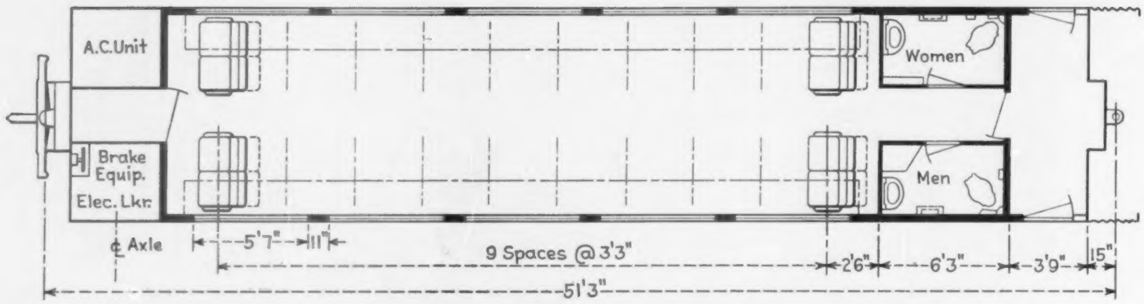
Pullman-Standard's bidirectional, low-center-of-gravity, roll-compensating lightweight design, now well known as "Train X," will soon become a reality after several years of extensive study and testing. Two prototype trains are under construction—one for the New York Central and one for the New Haven. These two five-car trains are essentially alike in mechanical details but have some differences in interior and exterior treatments. The design permits train trailing weights of approximately one third the conventional, utilizes relatively low-cost electrical equipment, is developed for low contour, low center of gravity, and inherent self-banking. First cost, operational cost and maintenance should decrease as direct functions of these vital factors.

An Overall Look at "Train X"

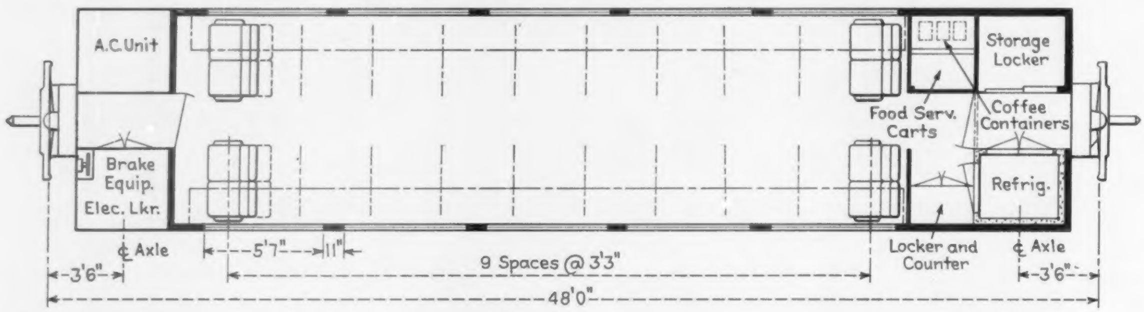
"Train X" is designed for either single- or double-end operation. Each prototype train accommodates 392 passengers and each train consists of four two-unit, single-axle cars and one single-unit, double-axle center car. The center car is provided so that cars ahead will have their wheels forward with each trailing end suspended on the car behind. Cars to the rear of the central car will trail their axles to the rear and be suspended by the car ahead. Thus, the cars may stand as an integrated unit which can be switched from either end.

Each two-unit car is permanently coupled and integrally articulated. These two units consist of one 51-ft 3-in., 40-passenger unit, with vestibule and side door, and one 48-ft, 48-passenger unit. Automatically operated dolly wheels, interlocked with the coupling mechanism, are provided on the non-suspension end of this latter unit to allow switching and coupling. The 40-passenger 48-ft two-axle central car has lockers at one end of the car for food storage and refrigeration, and for housing two food carts for serving light lunches fore and aft in the train.

Vestibule entrance doors are provided at the center of each double-unit car. Although these doors are much lower than on conventional equipment, the train can operate with existing loading and unloading facilities. Passengers will step up to platform height and down to ground level.



THE 40-PASSENGER UNIT of a "Train X" two-unit coach. The 48-passenger unit is 48 ft long. The entire floor is occupied by seats. Air-conditioning and electric lockers are located above the wheel houses.



THE SINGLE-UNIT two-axle coach seats 40 passengers.

Realization of a carbody roll favorable to passenger comfort defines center-of-gravity location below the pivotal point. Space limitations practically preclude such a design. However, such results can be accomplished by a proper suspension mechanism.

Relatively, "Train X" has a low center of gravity and a high spring location. The carbody weight, supported on self-leveling air springs, is transferred to the single axle by inclined struts which move angularly with body lateral movement, thus causing the body to lean in the direction of the lateral force, allowing greater speeds on curves with comfort and safety, Special air valves automatically maintain a constant floor height irrespective of load.

As the air spring is depressed by vertical impacts, air flow is to and from the spring and adjacent reservoir, providing a "floating-on-air" support for the car body. The bellows and air reservoir are so proportioned that the natural frequency of the suspension can be controlled despite wide variations in load.

The bellows is supported by a spring base in the form of a horizontal stay connected to the carbody side frame. This stay carries the horizontal component of the inclined strut and serves to keep the spring base in position regardless of longitudinal steering and braking-force influences. A rubber pad is introduced between this stay and the upper end of the strut to cushion the horizontal force and to provide a steering pivot.

To provide resistance to counterbalance the inherent instability of the mechanism, torsilastic units are located at each end of each main strut. These units resist angular motion of the strut from normal and further serve to dampen and absorb shock.

Roller journal bearings, each accommodating the torque loads from the torsion units and the lateral thrust from the angularly positioned struts, are encompassed by a housing on which are mounted the foundation brake rigging, steering rods, and trunnions for the struts. The wheel and axle are conventional railroad type.

Steering

The original "Train X" was designed for one-direction operation. However, proper steering has been developed to make the train bidirectional. When "Train X" negotiates a curve, each carbody section creates an angle with respect to the adjacent car body. The coupler between cars must pivot through this angle. The "Train X" coupler mechanically and automatically adjusts the car axle to its proper position by suitable lever-type linkage. With cars permanently coupled together, the adjacent car body can be used directly for this function. The train trailing axle, having a negative angle, has the steering device locked so that the axle is always normal to the car body and the car can be operated safely. The leading car is coupled to and steered by the locomotive. The coupler of the latter must be specially designed.

The Single-Shoe Tread Brake

The single Cobra shoe-on-tread brake rigging for "Train X" is of the unit type with cylinder and shoe for each wheel. A relatively small brake cylinder is vertically mounted on the journal saddle casting outboard of the wheel and the brake shoe is applied to the top of the wheel. The brake-cylinder push-rod end is pinned to clevis lugs provided on the journal saddle casting and is free to rotate. The cylinder-body assembly moves vertically along the push-rod axis. The two cylinder levers are fastened to the brake-cylinder non-pressure

head by a trunnion-type mounting, pinned at the center through a lug on the journal saddle casting, and pinned at the end to the brake head. A manual-type slack adjuster facilitates complete shoe wear with one adjustment after the initial setting. New shoes are easily applied.

On both prototype trains, the mechanical brake is actuated pneumatically and is controlled by electropneumatic brake equipment.

Coupling

The load-carrying automatic coupler was especially designed for "Train X." There are two distinct portions of this device. The male-coupler portion is mounted on the axle end of the car and joins with a mating female portion on the dolly-wheel end of the adjacent car. Each coupler portion includes electrical connectors having multiple circuits, a straight-air pipe connector, and a supervisory pipe connection as well as the necessary automatic operation interlocks.

An air cylinder is provided to rotate the dolly wheel shaft, raising when coupling and lowering when uncoupling. This operation also actuates a coupler latch. A relay air valve automatically deflates the air springs when coupling and automatically inflates them after coupling is completed. A small handle must be used in either of the uncoupling valves provided on the end of the car. The valve is turned to uncoupling position to separate the cars.

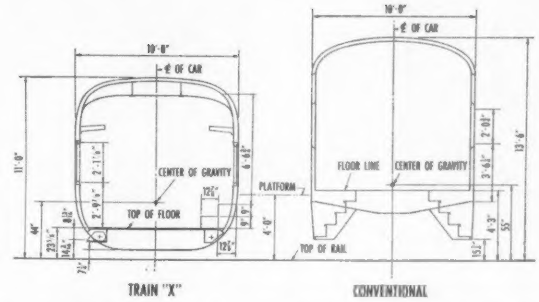
Acoustic Design

Extensive sound and vibration measurements have been made on both conventional and early "Train X" test cars. Noise-reduction requirements have been established as a function of frequency for related components of "Train X."

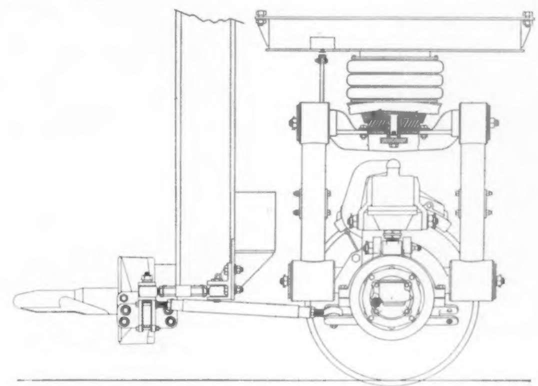
The primary objective of this acoustic approach was the construction of a tight box for the interior of the car, completely divorced acoustically from the car structure. This is achieved by "floating" the floor on isomode pads using vibration mounts and specially designed rubber moldings for supporting the side finish and with a soft vinyl-faced Fiberglas for headlining. Metal panels are either treated with a sprayed or damping material or damped by the plastic material used for inside finish. All holes through the box necessary for air flow receive a special treatment in the form of acoustic baffles, acoustic duct lining, etc. Double-wall sound barriers are used at the wheel wells. The glass in the double pane sash is spaced extra wide to eliminate acoustic coupling between the inner and outer panes.

Electrical System

The auxiliary electrical power for train air conditioning, heat, and lighting is supplied by a diesel-driven alternator in the locomotive. This alternator also supplies power for the locomotive fans, compressors, etc. The New Haven train has two locomotives—one at each end for double-end operation—while the New York Central train is powered by a single locomotive. On the former, power is fed from each locomotive to supply demands of half the train and the alternators are not



HOW "TRAIN X" and conventional coach cross sections compare.



LONGITUDINAL VIEW of the single-axle suspension and steering connections to the coupler.

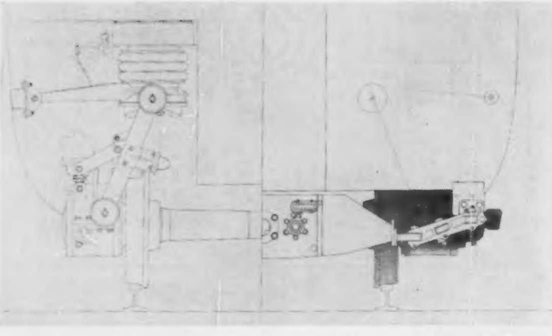
paralleled. In the New York tunnels, the diesel engine in shut down and the alternator is driven by a d-c motor with power supplied from the third rail.

After careful consideration of distribution, availability of standard equipment and anticipated train auxiliary loads, 480-volt, three-phase, 60-cycle power was specified. The five-car, nine-unit train requires 283.5 kw. The maximum connected load in the air-conditioning season is 144 kw.

The main power trainline is a three-phase bus duct of the feeder-type mounted in the roof space above the ceiling. Bus bars are of aluminum and insulated. The bus-duct casing is aluminum and ventilated. Power is carried between units on the coupled ends through an automatic power trainline coupler mounted on the outer diaphragms. Control contacts in the coupler head act to remove all loads from the connection prior to breaking the main power contacts. On coupling, the main contacts connect before load is applied to the line. The power train connections are permanently coupled between the units of the two-section car.

Each car is equipped with a three-phase transformer connected Delta to the 480-volt train bus and Star on the standby side (208-120 volt). Miscellanous loads requiring 208 or 120 volts are taken off the Star connection. On standby the car is automatically isolated from the trainline. Power is fed into the 208 volt Star connection of the transformer and 480 volts are furnished to the air-conditioning and heating equipment from the Delta side.

Conventional passenger-car electrical systems represent a most effective barrier to standardization and the ease of



TRANSVERSE VIEW of the suspension (left) and the steering connections (right).

interchange. The system provided on "Train X" is economical to buy, install and operate, and uses equipment that is produced in large quantities for widespread use in industry. Pounds of weight saving per kilowatt of constant power contribute greatly to these new designs.

Heating

Full automatic control for electric heating and for cooling each car is contained in a simple and light panel. Radiant panels utilize convection and radiant heat and include an electric heating element.

When car temperature drops below the control point, one third of the electric heating potential is introduced in both the overhead and floor heat by connecting the heater elements in a Y connection. As the heat load increases to the point where the first step is unable to keep the car at the control point, a second contact on the heating thermostat switches the heaters to a Delta connection giving 100% heating capacity from the same units.

A low-limit duct thermostat automatically calls for full overhead heat should the duct temperature fall below 70 deg F while the main control calls for low heating. This will obviate any possibility of cold drafts developing as the heating load passes through the changeover point between low and high heat demand. For layover position, the blower control switch is placed in "off" position. The overhead heat is locked out by the interlock on the blower-fan contactor and full floor heat under two-step control is available for maintaining the car at 60 deg F. Floor heat capacity is sufficient to maintain car losses to -20 deg F.

The second step of heating is cycle-modulated, allowing an "anticipating effect" to sense the car demand between the first and second step to eliminate over and under temperature runs. The cooling control circuit is the conventional two-step arrangement with the first step starting the compressor and the second step opening the solenoid valve to feed the full evaporator. Heating is interlocked through the cooling pilot relay to prevent chance of heating and cooling at the same time.

Air Conditioning

The complete assembly of this lightweight, low-maintenance air conditioning equipment includes the sealed motor-compressor unit, air-cooled condenser, split-coil evaporator, condenser fan, air-circulation fan, electric-heat coil, and air filters.

Air distribution in the car is through a lightweight molded central duct. Discharge into the car is through two strips of adjustable slot diffusers, one set on each side of the air duct. The space between the diffusers is used for a luminous element.

This design permits the use of an entirely self-contained unit with size and weight approximately one third that used on the conventional car and with piping and wiring the entire responsibility of the vendor.

"Train X" has an aluminum-alloy superstructure mounted on an underframe having steel end sections and an aluminum-alloy center section. The structure meets all the applicable requirements of AAR and RMS specifications even though the train weight is well below 600,000 lb. The structure is suitable for longer trains exceeding this weight.

Longitudinal members are extrusions and are joined to pressed carlines, side posts, and crossbearers. These pressed members are heat-treated after forming for maximum strength and, when assembled, they form a series of ribs or hoops. Center sills are aluminum alloy, and have an area of 24 sq in. Belly sheets connect the center sill to the side structure. The center sill is connected at each end to a steel structure designed to transfer coupler forces safely.

Aluminum-alloy crash posts are provided on each side of the passageway at each body end. The balance of the end structure is aluminum. The wheel wells and end sills are framed with welded high-strength, low-alloy steel. The entire structure weighs less than 7,000 lb for a body length of 45½ ft.

The interior trim, sash, racks, seats, floor, train lines, etc., weigh about as much as the structure itself, bringing the complete body weight of the center section to approximately 300 lb per ft of length. This weight is only 13,000 lb complete for the 48-passenger compartment.

The balance of the body weight is 10,000 lb and consists of equipment in the end lockers, wheel wells, couplers, etc. The wheels, axle, and suspension details bring the total weight of the 48-ft car to approximately 28,500 lb. The entire train will weigh less than 135 tons empty and about 165 tons loaded.

Interior Styling

Distribution of color arrangements makes possible an alternating pattern so that no adjacent cars appear to be similar. Each of three basic schemes specifies material highly resistant to abrasion and impact and having desirable acoustic, thermal, and application characteristics. Lightweight vinyl tile floor covering may be applied in squares allowing ease of replacement or repair. A comfortable and lightweight reversible reclining seat is provided, with durable, elastic-backed, easily maintained vinyl upholstery.

Tinted heat-absorbing glass in the side windows eliminates glare and obviates need for window shades or draperies.

The ceiling and side walls are illuminated by indirect fluorescent tubes concealed behind air-conditioning diffusers at the car center. Additional light is supplied at the reading plane by fluorescent tubes mounted above translucent safety-glass panels directly over the aisle, or this can be accomplished by installation of spotlights.

WIDTH OF OPENINGS needed for the superhighway is indicated by this view of the LaSalle street station train-shed. Note at right pile of old track spans and supports removed to permit installation of new 60-ft spans.

BUSINESS AS USUAL WHILE

Highway Goes Under a Station

Work of installing bridge spans to carry 11 tracks across a superhighway complicated by heavy railroad traffic and close clearances

Projects involving the construction of bridges to carry railroad tracks over highways are commonplace. Engineers have evolved what amount almost to standard procedures for coping with these situations. But suppose the highway opening, with sidewalks, is 116 ft wide and must be projected under 11 tracks at a busy passenger terminal? This is a special situation for which special measures must be devised, and that is just what was done in planning for a project now under way at one of Chicago's large passenger stations.

THE SITUATION...

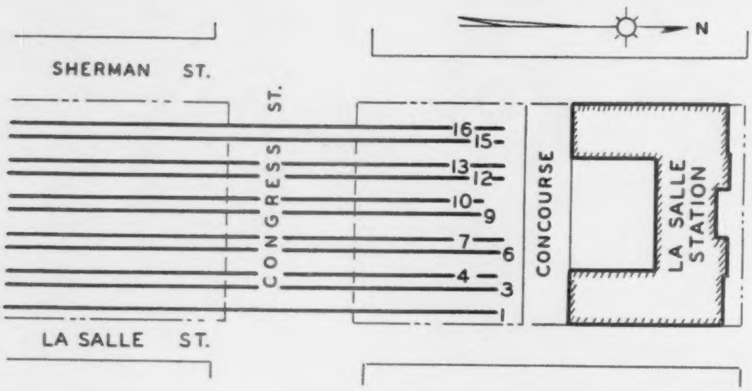
Chicago's West Route Superhighway, more commonly known as Congress Street Superhighway, will pass under the tracks of the LaSalle Street station, jointly owned by the New York Central and the Rock Island. In this station the tracks are elevated 15 ft above street level. To allow space for facilities beneath the track level the tracks are supported on a series of plate girders carried on structural columns. The facilities occupying this space include taxicab driveways, passenger transfer service, baggage, mail and express handling operations.

The design of the superhighway calls for eastbound and westbound roadways 44 ft wide. There will be an 8-ft median strip within the railroad station limits.

Railroad traffic will be carried over the superhighway by a series of 60-ft deck-type beam spans. There will be two spans for each of the 11 station tracks and 2 lighter spans for each of the 6 station platforms, making a total of 34 bridges. These spans will be supported on concrete piers, which have been built. Prior to construction of the piers it was necessary to rearrange the facilities at street level underneath the tracks.

THE PROBLEM...

The project is now in its final and most critical stage —removal of the present track structure and its supports and the installation of the beam spans. In this work it is imperative that all essential operations of the railroads be maintained. At the track level there are approximately 9,000 train movements monthly, involving



WEST ROUTE superhighway (Congress street) will pass under the trainshed of LaSalle Street station. Track numbers go up to 16 but there are gaps indicating tracks removed years ago to permit wider track centers.

CONSTRUCTION YARD where new 60-ft spans, fabricated at builder's plant, are finished by installation of concrete decks and short wood ties. At right is span loaded on flat car for movement to station.

in excess of 130,000 railroad cars which transport over 1,000,000 passengers. These same trains handle great amounts of baggage, express and mail. These operations utilize 11 tracks and 6 platforms.

Can Only Use Two Tracks—To maintain railroad service without serious interruption and to complete the work in the shortest time consistent with economy, the contractor was asked to comply with several restrictions. First, he must not take more than two tracks out of service at any time. The trackage to be taken out of service includes 120 ft of rail from the bumping posts to the north side of the superhighway, 120 ft of rail over the roadways and 40 ft of rail immediately south of Congress street. These 280 ft of track deprive the station of $3\frac{1}{2}$ car lengths for each track not in operation.

Secondly, the contractor must completely enclose the 280 lin ft of working area with solid barricades 8 ft high. This is to protect the public and prevent interference with normal operations by discouraging "sidewalk superintendents" from blocking station platforms. More important, however, these barricades provide the contractor with an enclosure within which he may work during any hours he chooses and within which he may store his construction materials and equipment. The working area provided is 30 ft wide and encompasses two tracks.

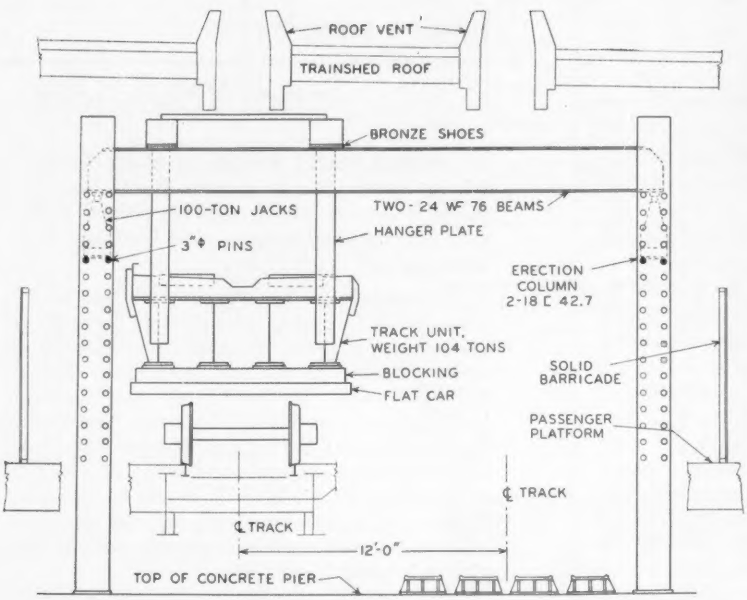
No Work During Holidays—Another restriction, occasioned by heavy passenger, mail and express operations during the Thanksgiving and Christmas holiday season, was that all station tracks and platforms must be in service for their entire lengths during the period November 15-January 10. The contractor, therefore, was not permitted to begin any operation involving the track or platform structures which he could not complete by November 15.

Finally, it is incumbent upon the contractor to complete the renewal of the track and platform structures with the maximum time of tracks out of service limited to a total of 180 calendar days.

...AND THE SOLUTION

After considerable study by the engineers of the city of Chicago and the railroads, a feasible solution to the problem, consistent with the restrictions, was evolved and included in the contract documents as a suggested method of procedure. The low successful bidder, the James McHugh Construction Company, Chicago, has elected to follow the suggested method.

The steel for the track and platform units is fabricated at the American Bridge Company's plant at Gary, Ind. The track and platform spans are then shipped to Chicago where they are completed in a construction yard furnished by the railroads, which is a short distance from LaSalle Street station. Two temporary construction tracks have been built which tie into the adjacent yard.



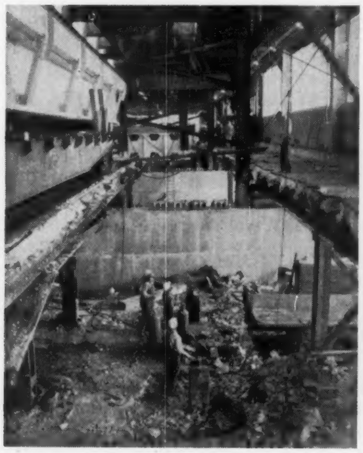
JACKING arrangement is designed to permit spans to be lifted from cars, moved sideways and lowered to their bearings. Jacks for sideways movement not shown.

COLUMNS each have 100-ton jack. Jacks are supported in columns on 3-in. pins. When jacks reach limit of movement the jacking beams and the span supported from them are held up by 3-in. pins while jacks are reset.

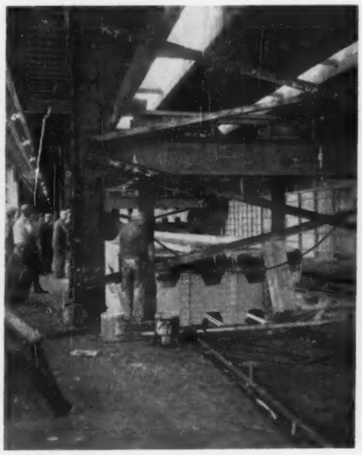
Installing the Spans—When a pair of spans is ready to be installed the contractor is permitted to take two station tracks out of service and begin construction of the necessary barricades. After the barricades are in place, one of the two out-of-service tracks and its supporting structure are removed while the other remains to serve as a "work" track. The erection equipment (see diagram), consisting of jacking columns, jacking beams and hanger-plate assemblies, is then set in position. Next, one of the track spans, weighing 104 tons, is loaded onto a flat car in the construction yard and is brought into the railroad station on the "work" track which is adjacent to an open hole previously made in the track structure.

The new span is spotted with its ends directly under the jacking beams. The hanger plates are then fastened to the ends of the track spans; one hanger plate at each corner. By means of 100-ton pneumatically operated jacks inside each of the four jacking columns, the jacking beams are raised slightly permitting the removal of the flat car. Next, through the use of two 15-ton track jacks mounted on top of each jacking beam, the hanger-plate assemblies are moved 12 ft sideways until the track span is located directly above its final position.

After this, the jacking beams are lowered about 10 ft until the track span is seated. A second span is then positioned on the "work" track and is similarly set in place. Rails are then spiked on the new track structures. This newly restored track now becomes the "work" track, and the previously used "work track" and its



WORKMEN gaze up through hole in trainshed floor as one of new spans is being lowered in background. At left another span is ready for installation.



LOW OVERHEAD clearance imposed by trainshed roof is apparent from this view showing a span disappearing into hole in floor.

THE NEW SPAN is now in position on piers, ready for placing track rails. Note 8-ft barricade at right enclosing working area.

supporting structure are removed and two additional track spans are set into position using the same procedure. A service walk suspended between adjacent track spans is then constructed.

The first pair of tracks were taken out of service on September 14, 1955, and the first track span was set in position on September 30. The contractor's operations are proceeding from west to east within the confines of the station.

How Platform Spans Are Placed—After the construction of a pair of tracks with their supporting structures, the contractor temporarily omits the installation of a platform and proceeds to renew the next easterly pair of tracks and their supporting structures. Following this operation the platform temporarily omitted, together with the two immediately adjacent newly installed tracks, are taken out of service. A temporary platform is then laid on one of the out-of-service tracks while the other track now serves as a "work" track. The existing platform span is then removed and railroad operations which previously utilized this platform are detoured over the temporary walkway. A platform span, fabricated in the construction yard and weighing approximately 50 tons, is loaded onto a flat car and is brought into the station preceded and followed by self-propelled steam-operated 50-ton cranes.

Through the use of specially designed short booms (vertical clearance within the station is limited to 16 ft), the platform span is set into position by the cranes. This process is again repeated with a second platform span.

Following the general procedure as outlined the 22 track spans and 12 platform spans will be set into place. At the conclusion of this work, the roadways will be ready for paving and a most critical operation will have been completed.

Those Who Were in Charge—The plans for this project were prepared by the Bureau of Engineering, Department of Public Works, city of Chicago, with the close assistance of the New York Central and the Rock Island.

F. H. Simpson is chief engineer for the New York Central and W. B. Throckmorton is chief engineer for the Rock Island.

For Chicago, Walter E. Rasmus, assistant chief engineer, was in direct charge in the preparation of the design plans, with Al Butler, head of the structural section, and P. Solheim, designer, responsible for the structural design.

For the railroads, G. E. Robinson, engineer of structures, NYC, was in direct charge of the work, M. J. Plumb and Milton Pikarsky, assistant engineers, NYC, were responsible for the structural design. Mr. Pikarsky served as liaison between the city and the railroads.

The steel erector is the F. K. Kelter Company, Chicago. F. K. Ketler, president, E. S. Joehnk, chief engineer, and Dan Johnson, general superintendent, are responsible for development of the erection equipment used.

Construction is under the general supervision of J. Walter Grimm, asistant chief engineer, city of Chicago. A. J. Kinder is the resident engineer for the city. Mr. Pikarsky is engineer in charge for the railroad companies, with G. P. Wright of the Rock Island assisting.

Benchmarks and Yardsticks

THE MILITARY RAILWAY SERVICE made a large contribution to winning World War II—and provided a training ground for railroad leadership which is continuing to yield important benefits to the railroad industry.

Fortunately, to get the facts on the record, Gen. Carl R. Gray, Jr., shortly before his untimely death early in December, had the satisfaction of seeing published his definitive story of the Military Railway Service. The book is entitled "Railroading in Eighteen Countries" (Scribners, New York). To your reporter, the central message of the book is its demonstration, again and again, of how U.S. railroaders and their methods greatly increased the traffic-carrying capacity of any railroad they took over—an increase made frequently without any change in plant.

General Gray recalls, for example, that in the North African campaign the MRS increased the daily tonnage of a local railway from the then absolute maximum of 900 tons a day to 3,000 tons—without any U.S. equipment.

The MRS included and developed a lot of ability in railroad supervision. Out of some 16½ million Americans in the armed forces, 43½ thousand were soldier-railroaders—most of them railroad men in civilian life. Only two officers who entered the MRS had been general officers of a railroad. But, today, the veterans of MRS number scores of general officers, including six railroad presidents—viz., Budd of the GN, Deramus of the CGW, Johnson of the Erie, Okie of the B&LE—Union, Rice of the RF&P, and Stoddard of the UP.

The most exciting (to your reporter) reading in the book is the description of the MRS' action in the break-through at Kasserine Pass, when the soldier-railroaders found themselves ahead of our fighting lines. It was in this phase of MRS operations that Colonel Okie made his brave and memorable *coup*.

A good deal of the success of the MRS was the result of detailed and careful planning. In prepartion for the invasion of France, for example, steam locomotives of our forces had water placed in the boilers while they were still in the marshalling yards of Britain. Wood and papers were put in the fireboxes, ready for a match upon arrival on the Continent, with enough water in the tenders to get the engines moving, at least.

With all the perfection of present-day scientific railroading, the industry will never overcome its need for skill in improvising—a skill which gets its ideal workout in military operations. And the improviser does a far better job, to the degree that his imagination has enabled him to prepare in advance for most of the contingencies likely to arise.

J.G.L.

(*Continued from page 16*)
Steel Castings Company, at Columbus, Ohio.

Assets of **Tracto-Lift Company** have been purchased by Ottawa Steel Division of **L. A. Young Spring & Wire Corp. Ernest C. Jones**, former president, has joined Ottawa Steel's sales force.

OBITUARY

Frank E. Payne, 72, chairman of the board and co-founder of Crane Packing Company, died November 20 at Glencoe, Ill.

Railway Officers

CANADIAN NATIONAL.—Gordon M. Greenbury, assistant chief of car service at Montreal, has been appointed chief of car service, succeeding **Frank Simpson**, who re-

Gordon M. Greenbury

tired December 1. The position of assistant chief of car service has been abolished.

V. E. Morton, division master mechanic at Toronto, has been appointed assistant superintendent, Toronto terminals.

Harry Taylor, assistant general superintendent motive power (works), Western region, at Winnipeg, Man., has been appointed general superintendent of motive power and car equipment of that region, succeeding **Eric Wynne**, whose appointment as chief of motive power and car equipment at Montreal was noted in *Railway* Age, November 21.

John C. Grantz, general agent at Memphis, Tenn., has been transferred to Kansas City, Mo., succeeding **Sidney Emberg**, who has been transferred to Chicago. Mr. Emberg succeeds **William McLeod**, who has been promoted to assistant to general freight traffic manager. **Rodney H. Reilly**, chief clerk to general freight traffic manager, succeeds Mr. Grantz as general agent at Memphis.

J. A. Breau, general passenger agent at Montreal, has become special assistant to passenger traffic manager at Toronto; **P. George Edwards**, assistant manager, tariff and ticket bureau, at Montreal, succeeds Mr. Breau as general passenger agent there; and **C. E. Courture**, superintendent of colonization and agriculture for Quebec, at Montreal, has been named assistant general passenger agent at that point.

Reginald Hugo, assistant bridge engineer, Western region, at Winnipeg, Man., has been promoted to bridge engineer of that region. He has been succeeded by **Alexander M. Pepper**, structural designer at Winnipeg.

Isaac Lucas, superintendent, Port Arthur division, at Port Arthur, Ont., has been appointed general superin-

Isaac Lucas

tendent, Manitoba district, at Winnipeg, Man., succeeding **Timothy S. Sullivan**, retired.

GALVESTON, HOUSTON & HENDERSON.—Harold E. Smith has been elected president, general manager and treasurer at Galveston, Tex., to succeed **George G. Moore**, who retired November 8 after nearly half a century of continuous service with this road.

GREAT NORTHERN.—H. H. Holmquist has been appointed director-specialized services at St. Paul, Minn.

Ralph J. Merklin, general agent at Klamath Falls, Ore., has been appointed to the newly created position of general agent at Portland, Ore. **E. W. Carter**, traveling freight agent at Portland, succeeds Mr. Merklin as general agent at Klamath Falls.

Gordon A. Richardson, assistant general auditor, has been appointed assistant comptroller. **H. D. Lear**, general statistician, has been promoted to assistant general auditor, costs and statistics, and **M. E. Strong**, statistician, has become general statistician.

GULF, MOBILE & OHIO.—

CHESAPEAKE & OHIO.—Dr. Charles E. Lawall, assistant vice-president—coal traffic and development at Huntington, W. Va., has been named assistant to president—coal traffic and development at Cleveland, succeeding the late J. W. Bahen (*Railway Age* November 21, page 54)

B. B. Briggs has been appointed district freight traffic manager at Minneapolis, succeeding **Andrew A. Thorberson**, who retired November 30 after more than 48 years of railroad service, the last 43 of which have been with the GM&O and predecessor companies.

Y. D. Lott, general solicitor at Mobile, Ala., has been elected vice-president and comptroller at that point, effective January 1, 1956, succeeding **R. E. DeNeefe**, who retires December 31, after more than 50 years in the railroad industry and 32 years with the GM&O and its predecessor and subsidiary companies.

LAKE TERMINAL.—H. A. Loutzenhiser, supervisor maintenance of way at Lorain, Ohio, has been appointed assistant general superintendent there, effective January 1, 1956, succeeding **H. W. Vogenberger, Jr.**, who will become general superintendent of the **Donora Southern** at Donora, Pa.

LEHIGH & NEW ENGLAND.—H. C. Tunison has been appointed chief engineer at Bethlehem, Pa., succeeding **H. E. Jones**, who has retired after more than 35 years of service with the L&NE.

LONG ISLAND. — Thomas M. Goodfellow, vice-president and general manager for the past 16 months, has been elected president and general manager, effective January 1, to succeed **Walter S. Franklin.**

LOUISVILLE & NASHVILLE.—C. C. Vaughn has been appointed general agent at Anniston, Ala., succeeding **W. A. Roelker**, deceased.

Claude M. Beeler has been appointed district freight agent at Owensboro, Ky.

NEW HAVEN.—Edward J. Kehoe, special consultant to the president, has been appointed an executive officer in the mechanical department at New Haven. In his new position Mr. Kehoe will work on creative and long range programs such as research

Edward J. Kehoe

Daniel P. Prendergast

Sindo E. Cavalieri

and development, executive communications, supervisory development, and the application of atomic energy and he will handle special projects as assigned by the chief mechanical officer.

Daniel P. Prendergast, supervisor of locomotive maintenance at New Haven, has been named superintendent of mechanical maintenance at New York, with supervision of mechanical maintenance at Oak Point, New York, Harlem River, Bay Ridge and Pennsylvania station and also will have charge of marine maintenance.

Sindo E. Cavalieri, manager, employees' suggestion system, has been appointed manager, employment and records at New Haven. He has been succeeded by **Bradford E. Cole,** who has been his assistant since June.

SOUTHERN.—J. R. Ford, assistant general passenger agent at Asheville, N. C., has been promoted to general passenger agent at New York, succeeding **P. A. Schumpert,** who retired December 1 after 43 years of service. **J. O. McCollum,** general agent, passenger department, at Detroit, Mich., has been promoted to assistant general passenger agent at Asheville, to succeed Mr. Ford. **R. S. Tannehill,** district passenger agent at Chattanooga, Tenn., succeeds Mr. McCollum at Detroit. **E. L. DeLoach,** secretary to general passenger traffic manager at Washington, D. C., succeeds Mr. Tannehill as district passenger agent at Chattanooga.

Meek M. Winkle has been appointed supervisor communications at Greenville, S. C., succeeding **Andrew H. Gregory,** who has retired after more than 40 years of service.

Richard E. Franklin, superintendent maintenance equipment at Charlotte, N.C., has been appointed assistant vice-president, mechanical, at

Richard E. Franklin

Washington, D.C., succeeding **Max R. Brockman,** who retires January 1, 1956, after more than 43 years of service. **Robert S. Hamilton,** plans engineer (mechanical), has been promoted to the newly created position of assistant chief mechanical officer, with headquarters remaining at Washington. **Joe G. Moore,** superintendent, roadway shop at Charlotte, has been promoted to superintendent of maintenance equipment at that point.

Mr. Franklin was born December 3, 1919, at Birmingham, Ala., and entered the service of the Southern on September 1, 1937, as a laborer and machinist helper in the Birmingham shops, subsequently serving as a machinist apprentice, machinist, assistant erecting shop foreman, and erecting shop foreman. In April 1944 Mr. Franklin was promoted to general

Robert S. Hamilton

foreman at Danville, Ky., and in November 1944 he entered military service. Returning to the Southern in February 1947 as general foreman at Ludlow, Ky., he later served as master mechanic at Meridian, Miss., and Birmingham. In December 1952 he was promoted to superintendent maintenance equipment at Charlotte.

WESTERN PACIFIC.—A. L. Herbert, assistant signal engineer, who has been appointed signal engineer at San Francisco (*Railway Age*, November 7, page 47).

OBITUARY

Elmer J. Lamneck, 68, retired general purchasing agent of the **Pennsylvania,** died December 14 at his home in Bryn Mawr, Pa., after a long illness.

D. M. Driscol, 77, retired assistant to vice-president in charge of operation and maintenance of the **Northern Pacific,** died recently at Antigo, Wis.

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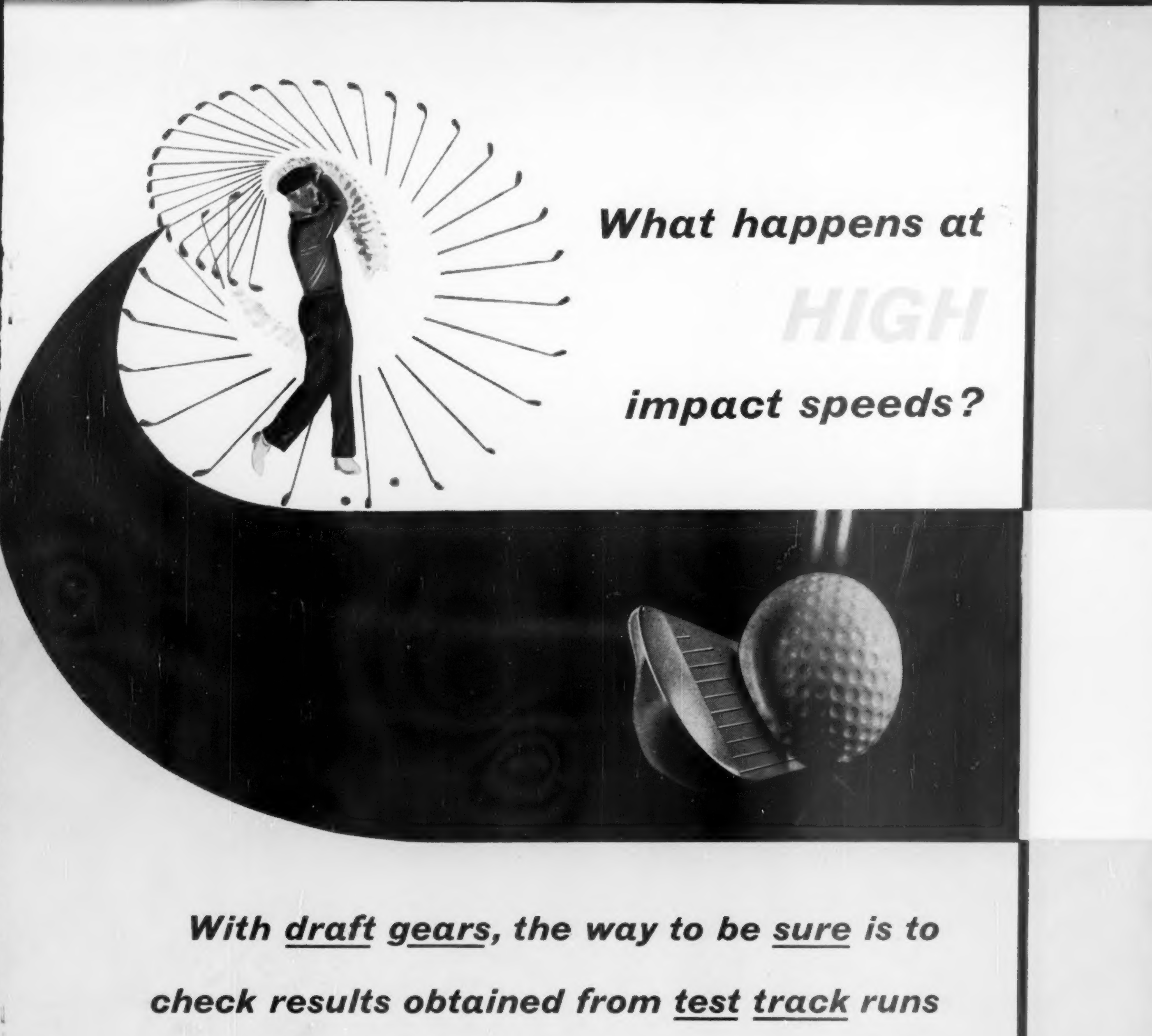
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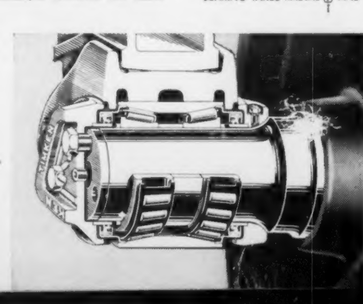

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